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'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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WHAT DOES FRÖBEL TEACH US?

BY EMILY A. E. SHIRREFF.

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II.

STUDY OF CHILD NATURE.

IN a former paper I classed generally under three heads the leading principles of education as taught by Fröbel: namely,

1.—Education must be according to nature.

2.—Education is the harmonious development of all the faculties of the human being.

3.—Education is continuous.

I propose in this and the following papers to take these subjects in their order.

It is obvious that the first step towards educating children according to nature is to study in the child the indications of nature's purpose, what she promises towards fitting them for the future that dawning life points to. Its bodily structure marks its place in the animal creation, and soon the awakening mental faculties will witness to its destiny as an intelligent being. Like all other young animals, when its first imperative wants of food and sleep have been satisfied it shows a love of movement; it moves its limbs, and likes to have them moved, and presently begins to use its hands—those truly marvellous instruments of combined activity and intelligence with which man is gifted by nature. This rapid glance suffices to establish that the child, as regards his physical life, is naturally active; it rests with education to give the right direction to its activity.

The intellectual faculties awaken somewhat later and develop slowly, but the child soon shows some consciousness of surrounding things; motion, light, colours, sounds, attract its dawning attention, and some mental instinct stirs within, prompting the desire to know more about them—to handle objects, to look for the light, to listen for the sounds, and soon to imitate them, or whatever movement seems to have produced them. Thus we see awakening to life the latent powers of observation and attention which become the indispensable companions and guides of every step in the progress of the human creature. Nature has given the instinctive faculty, education must cultivate and direct it.

Again, our study of the child leads us to the earliest indications of the moral nature. Where love and care surround the cradle it is promptly seen how keenly the joy they give is felt even by an infant, and a temporary privation of them brings out yet more strongly how they form the very atmosphere in which the young creature was destined to put forth the first germs of its moral life. Man is created a social being, and in the various social relations all that is highest in his nature is called forth. Education must foresee what this means in all its fulness, and once more foster and direct the natural impulse. It is in that sphere of his life that the child acquires the first dim notions of obedience, of kindness to others, of justice, of reverence, of responsibility, of duty, and finally hears the first lisping of conscience, the voice whose mandates must be the law of his riper life. It is a long way from the infant smiling in answer to its mother's smile, up to the fulness of moral being; but the initial steps begin there, in the instinctive yearning of a social nature. It seems needless to add that education has no higher task than to foster and develop what is thus revealed to us.

To sum up then: when in obedience to Fröbel's principle of education, according to Nature, we study the natural promptings of the little child in their earliest forms, we find the young life putting forth its shoots of physical, intellectual and moral activity spontaneously, and claiming our care and attention in these several directions; we find also that with or without us they grow and acquire strength, while the responsibility for the direction to be given is ours. For Fröbel, in his obedience to Nature, is far from adopting the views laid down by some other writers, according to which every natural propensity should be followed, and the child should learn his own lesson from experience, for he knew that Nature, by placing the human creature in a state of long dependence on parental care, had branded all such theories as equally criminal and absurd, she herself having provided the controlling influence under which are formed the later habits of the self-controlled moral life. He is anxious, therefore, to teach the method by which the necessary influence and teaching can be brought to bear; and the kindergarten is the practical exposition of

BRITISH MUSEUM

his educational theory for the earliest period of childhood; while it lays down the lines upon which progressive development should continue so long as the capacity for progress—in other words, the active exercise of human faculty—endures. And here we have Fröbel's third principle of the continuity of education; for while we live we must improve or deteriorate, the action of to-day must tend to make good or evil easier, more natural to us on the morrow. The one thing we cannot do is to stand still, whether in our mental or our physical life. Unspeakable is the responsibility that hangs upon this one fact.

It would be impossible here to enter into any description of the actual kindergarten method; the utmost we can do is to indicate the general principles on which it is constructed.

In physical training, for instance, following the child's natural impulse of activity, Fröbel desires that its movements should be free, that we should assist him in making them, help to vary them while gradually making them more graceful and active, frequently accompanying them with song, thus training the ear and sense of time and rhythm, while giving a new element of enjoyment. 'But,' you may say, 'even uneducated mothers naturally do these things'—so they do; but for an educational purpose it is needful that they should know *why* they do them, what result to expect from them, and should therefore choose the right time and the right manner. A more delicate part of physical education is that which trains hand and eye together in exercises, and games which teach skilful manipulation—an acquisition equally valuable to the workman or the artist—and gradually tend to form a habit of accuracy, which is one of the most essential points of mental, no less than of physical training.

In dealing with the intellectual faculties Fröbel proceeds in the same manner; he sees the child, as we said before, beginning to observe objects around him, then fixing attention upon one or another, next stirred by curiosity, which leads him to wish to learn more about them, to handle them, and find amusement in them, and this instinctive curiosity is strengthened by repeating the occasions for it, and thus confirming an association of pleasure with its exercise. Hence, we are shown that when the time comes for giving anything like real teaching, we must be careful not to thwart that association, but to lead the child still to learn with pleasure, by giving him what he would wish to know. All learning involves an exercise of observation, of attention, and of memory; let instruction, therefore, deal with things the child naturally observes and attends to, and he will have a pleasure in remembering them; whereas if we begin with memory, and exercise it mainly upon what we think useful, but which to the child seems useless and tiresome, though we may cultivate the memory, yet assuredly we shall inspire no wish to learn. The latter must be the educator's aim, remembering that love of knowledge is better a thousand times than any accumulation of common-place knowledge; and nature points the way that leads to it. Objectors will be ready to say that the method cannot be right, since all study cannot be agreeable; but there will be occasions enough later on to bring in the moral qualities of determination and self-control in mastering unwelcome tasks.

When the child's observation and attention have been duly roused, we gradually see him make an effort to understand what his natural curiosity has prompted him to observe, and the *how* and the *why* follow at no great distance after the conscious perception of objects, the sense of difference between them, and the kindling of curiosity. In these let us note that we have the first roots of love of enquiry, the mighty impulse of all intellectual activity. Thought, reason, discrimination, gradually come into play as the childish mind begins to work upon the objects observed, handled and enquired about. It is a ceaseless education going on by the instinctive process of nature; it is ours to follow and assist it.

The same following of nature must be observed in drawing forth the power of language, that wonderful gift of articulate speech which more than any other organic peculiarity lifts man above the lower animals. To give the right use of it is one of the most important branches of education, and the whole surroundings of the child, all the rich mental inheritance of the race, continue and complete what we have begun.

In ordinary school teaching language is cultivated by trusting many words to the memory, words that are half understood or too often altogether misunderstood, but Fröbel addresses the understanding while developing the power of speech. He uses words the child lays hold of eagerly, because they denote the things he has seen or handled, and wants to know more about. Once more it is not teaching in the ordinary sense, but *leading the child to learn* and to *wish to learn*. He wants to know about the birds and the beasts and flowers, and the work that goes on around him, and to hear the stories that relate to them, and so the words have a living meaning for him, and he remembers them, and tries to use them himself, that he also may be understood.

These few brief remarks will, we trust, suffice to indicate the difference in principle of Fröbel's intellectual training according to nature, and the training by means of books that commonly prevails. The latter gives information, Fröbel kindles a motive power; and the difference in result may be easily foreseen. While that which was trusted to the memory too often fades as time passes, and different interests surround us—and thus we see the lad who has crammed for an examination cast aside his books, and be unable in a little while to translate a Latin quotation, or in a lower class forget reading and writing altogether — Fröbel's disciple, who from the first has exercised with delight his own understanding, and gratified his own natural curiosity, will so have apprehended and enjoyed the things presented to him, that each gain in knowledge has been a conscious enlargement of power, bringing a new sense of pleasure in its exercise; and so the years as they go by will not rob him of the fruits of the past, but reveal to him fresh uses for them.

In moral training Fröbel still follows the same general method. In this highest department of education, as in the physical and the intellectual, progress must still be achieved by drawing out and exercising natural instincts and capabilities, not through teaching maxims and creeds. Great difficulties may often beset us, because temptations to evil are ready to meet every natural weakness; but love and trust are perennial in their source and continual in their influence, while the desires that may lead to wrong are fleeting and capricious; and all the surroundings of a *real home*, as of a good school, foster the better promptings of nature.

Our highest aim in this arduous work of moral training is to build up each young creature committed to our care to the full stature of a follower of Christ—one, that

is, who whatever his church or sect loves God and man, serves God and man, one who if but scantily endowed can yet see the beauty of holiness and truth, who if more richly gifted will keep pure ideals before his mind and pursue them with a strong and self-controlled will, one who while rejoicing in the exercise of whatever capacity he may be endowed with yet sets love and goodness and truth above the most shining gifts. And this, the highest task entrusted to mortal hands, must, I repeat once more, be accomplished by humble study of the means nature has placed within our reach; not by stern repression of wrong, but by ceaseless presentation of the good; not by breaking the will, but by strengthening and directing it, by drawing out and working upon the instincts and affections nature reveals to us, making them minister to our ultimate purpose; while we use the wonderful power of habit, without which education were impossible, to form associations, to prepare deep grooves of thought and feeling, to discipline the will in whose strength we rejoice, to convert childish obedience into subjection to the law of duty and conscience, until natural reverence is lifted up into religion.

Such is the aim of the moral training we strive to give, and the study of child nature in this, as in the other portions of education we considered before, gives us the first clue to guide our efforts. And thus we realise the truth of Fröbel's teaching, that only by following nature and framing our systems in accordance with what we learn from her, can we hope to lay a solid foundation for true human culture.

(To be continued.)

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DECORATIVE NEEDLEWORK.

BY MAY MORRIS.

EMBROIDERY.

Historical Glance.

It is only of recent years that the art of needlework has come to be divided by a hard and fast line into plain-sewing and embroidery. The two branches of the art are to my mind, and indeed used to be in practice, so nearly akin that the one merged into the other, and it is surely equally desirable to teach both. For it has become inevitable now-a-days to set about *teaching* this art as well as many another more important; the training formerly obtained by patient practice and watching a good method of work in a studio or 'workshop' (as they did not mind calling them then) being beyond the reach of most young people in these days, when apprenticeship is confined to mechanical trades, and disdained altogether by artists. In past times it was natural and instinctive to decorate one's stitchery; a seam or hem would have some little touches of the needle beyond the mere piecing together or turning in of raw edges: from this stage grew the enrichment of hanging or robe for avowedly decorative purposes, but it should be noted that all the decoration had meaning in its beauty. I will not stop here to consider this phrase, which will be referred to later on in discussing the suitability of embroidery to various objects. Well, now-a-days, about the only article of stitchery in which the two branches of the art, namely, plain sewing and embroidery, are wedded, is in the body-linen of a very fine lady, who loves to accumulate dainty linen round her fine as gossamer, wrought by she does not know or care what under-paid work-girl. The following lines from a popular fashion-paper describe with unction the beauties of such garments: 'The night-gowns are remarkable for their exquisite work, the dotting all hand-wrought, the tiny *à jour* veining appearing between the pleats' . . . and so forth *ad nauseam*.

But the hurry of modern life and the advent of cheap machine-work have between them done away with any leisurely decorating of garments except for the very rich, and, as aforesaid, plain-sewing is taught apart from decorative embroidery. The instinctive desire of man to ornament whatever article he makes with his own hand, to place his *mark* upon his handiwork, leads him to decorate his clothes and other possessions as soon as his primitive wants are assured, and he leaves the first stage of almost unreasoning savagedom. The early Eastern civilisations availed themselves abundantly of this art, and their chronicles record many instances of the skill of Babylonian and Egyptian workers, and of the beauty and costliness of embroidered stuffs made in these countries. Egyptian textiles and needlework were eagerly sought after by other people, especially by the Jews and Tyrians. The great merchant-city of Tyre, capital of Phœnicia, 'the renowned city strong in the sea,' was indeed a nucleus of all the arts, whither treasures and produce of all sorts poured in from every imaginable land. She is threatened with destruction in the height of her prosperity by the prophet Ezekiel, who describes graphically her trade development, and the perfection to which it is brought. With that versatility of a travelled people which made them their renown, the Tyrians assimilated the arts borrowed from Egypt and Babylon, and, among others, embroidery, which is much in demand, and brought to the highest perfection.' I must refer, too, to that already often-quoted passage in Exodus about the building of the temple, where the Jewish tribes doubtless placed, as an offering to their Jehovah, all the precious things they had brought away from that wonderful land, wise in all the arts of life, where they had lived so long. Among these treasures there are beautiful embroideries and cloths of gold, either brought with them or fashioned by themselves through their acquired knowledge; rich hangings for the tabernacle, a veil for the ark, and robes for the high priest, all wrought with the splendour of colour and wealth of work still dear to all Eastern nations.

Greece and Rome, too, made abundant use of needlework, and hundreds of quotations could be made from their authors bearing on the subject were it within the scope of my writing. But between the poetry of the ancient, and, frankly speaking, *conjectural* art, and the tangible reality of the mediæval, classical times lose their interest, and one is glad to turn to a period which repays all thought and search, to the art of the middle ages, of the XII. to XIV. centuries, where everything is instinct with life and originality in the handiwork of man. From these times (say from the XIV. century until now), the progression is also *downwards*, with reference to this art at least; and though professional skill is so well-rooted as to become greenly traditional for a long, long while later, design and invention are less markedly beautiful, and the early simplicity slowly gives place to a luxuriance and lavishness that marks the beginning of all decay.

For any one anxious to follow up this line of study in detail, it can be done to a certain extent merely by walking through our South Kensington Museum, to go no further,

and carefully noting and comparing the fine examples of early work displayed there. The great Syon cope is in itself a master-piece of design and workmanship, and is worked in a peculiar manner to which I may have occasion to refer in speaking of methods of work. This cope is an often-quoted example whose history in brief is that it was given by Henry V. to a convent at Isleworth at about 1414, though a piece of XIII. century work. But the nuns of Syon led a wandering life, and, in Elizabeth's reign, travelling far and wide, finally reached Portugal, where they settled themselves. It is not long since that this their great treasure came back home from Lisbon to England, to be wondered at in a dusky corner behind a glass case.

It will be noticed that most of the fine early embroideries preserved to us are ecclesiastical, but it is not to be inferred from this that the houses and clothes of our forefathers were as bare of such ornament as are our own. They naturally lavished the most costly specimens of their work on decking the buildings and vestments dedicated to their religion, but did not themselves therefore go without rich ornaments. There are existing certain inventories and descriptions of the hangings of hall and bower, cushion coverings and so forth, that give us a delightful glimpse into the interior of a well-to-do house of the middle ages, and of later times also. Loom tapestry was of course often employed for such things, but being essentially laborious and therefore costly, worsted or linen hangings, rather roughly worked, often took its place, and in old inventories we often see such work minutely described. Very gay and pleasant an old hall must have looked on a festival day (and holidays were many and more generally kept in those days), the rough stone walls hidden nearly roof-high by the warm coloured folds of stuff embroidered with fair roses, or 'portrayed full of woodland trees,' with perhaps a bordering of scrolls and shields with the possessor's device displayed upon them. Window seats and chairs would be fitted with embroidered cushions, screens and settles hung with gay cloths, and even the 'napery' or table-linen would not escape the busily plied needle.

As aforesaid, later work gradually degenerates; even the splendour of embroidery for wearing apparel at the French and English courts under Henry II. and Francis I. and Henry VIII. respectively, verges perilously near vulgarity in its extravagance. Coats and robes are loaded with work and jewels wherever it is possible to display either, until the unlucky bearers of these stiffly built-up garments look ridiculous far more than magnificent. Very handsome work is often to be met with at this time, of course, but the tendency is on the whole towards display and grandeur, and leaves far distant the repose and gravity of the best times. Thence our glance travels onward until it comes to actual ugliness and vulgarity in the latter half of the XVIII. century—'the great century,' as people were fond of calling it. But though the rich and important work is displeasing, we find a great deal of modest art that is delightful; flowery cloths and aprons worked by ladies at their leisure, or great bed-quilts and hangings, ingenuous and simple as regards design, but really prettily coloured, and stitched with some art.

So much for a brief glance at the growth of decorative needlework. It may seem at first sight unnecessary, but indeed could not be dispensed with. Even the slight guidance thus afforded as to the periods wherein to look for the best style, in order to study it, is a great help to the student while taste is being formed. Moreover, I find that in most people's minds there exists great confusion as to what is definitely the best work artistically. Few go back beyond the queer jumble of traditional design of the early XVIII. century, or the handsome florid renaissance styles of the XVI. and XVII. centuries, to the simple dignity and graciousness of mediæval work. It is here, in the Middle Ages, I repeat, the student must go for example and inspiration towards serious work: modern embroidery does not compare favourably with any period, but it is the very antipodes of the early art, and it is time that something was done to raise it to a higher level altogether.

(*To be continued.*)

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SCHOOL MUSEUMS AND HOW TO FORM THEM.

BY RICHARD BALCHIN.

In last month's issue of this magazine I gave a general description of the character and purpose of a School Museum. In this article I will indicate what my Museum contains, and how I have managed to get such a large collection. The glass wall-cases, already mentioned, are generally large enough to admit, not only the special apparatus and objects required in the respective classes, but also certain distinct sets of specimens illustrating something outside the mere syllabus of elementary science, or object lessons, adopted in the particular Standard which may, for the time being, happen to occupy the room in which the glass case is fixed. For instance, in Standard III. room, there is a large case with four glass doors. In the lower part we find all the odds and ends of apparatus, and objects specially used in this Standard. The other, and by far larger part of the museum, is filled with a set of minerals, arranged according to Dana. This collection was considered by Dr. Gladstone so interesting and complete, that he asked me to place it in the 'Education' section of the 'Inventories' exhibition. There are about three hundred specimens, divided primarily into metallic and non-metallic minerals. These are sub-divided into groups, and each specimen labelled thus:—name, locality, chemical composition, specific gravity, and hardness. To show how complete the collection is, I may say that the quartz or silica group contains flint, chalcedony, white sand, agate showing entrance of siliceous solution, agate pebble (rough), two of same polished, ferruginous quartz, quartz in hexagonal crystals (three specimens), rock-crystal, smoky quartz, milky quartz, amethyst, carnelian, cat's-eye quartz, opal (noble), opal (brown), bloodstone, auriferous quartz (showing the grains of gold in the line of junction between the quartz and the slate), smoky quartz crystals on specular iron-ore, and various specimens of quartzite rock. Besides this special collection, there are, in each room, the few minerals which the class-teacher needs in illustration of his own set of lessons.

Then again, we have in Standard IV. room, a portion of the case filled with specimens illustrating the Geology of our district, viz., Peckham. This is a particularly interesting collection. I seldom enter the school in the afternoon without finding some boys looking at these things, and carrying on a conversation about 'what is

underneath Peckham Rye.' On the south of the Rye we have a range of clay hills. During the excavation for the Nunhead reservoir, I obtained a good nautilus and several sharks' teeth; indicating that this clay was once the bed of an ocean. Underneath the clay, but coming to the surface further north, in Rye Lane, we have sandy clay, a clayey limestone crowded with fossils, all named in the collection, and old oyster-beds full of 'ostrea tenera'; these show an old river delta of vast extent, with occasional encroachments of the sea. The mud of this delta is full of impressions of leaves; some leaves indeed are here changed to true coal. These point out the kind of vegetation which grew upon the banks of this ancient river. Underneath these beds is a layer of sand; an old sandbank like the 'Goodwins.' Still further down we have the chalk. All these beds were cut through in sinking the well of Gordon Brewery, at which the father of one of our boys worked; this last fact accounts for the presence of many of the specimens in our collection. Then on the other side of Rye Lane—the north side—we have gravel and sand, Thames valley gravels, a comparatively modern formation, from which I have obtained the bones of the Mammoth, primeval bull, etc., along with flint implements used by man in this old stone age. Many of the objects in this collection have been presented to the Museum by the fathers of the boys. Of course, I keep my eyes open when any excavation is going on in this locality. I may add that my explanation of the things found and brought to me, causes a good many other people to open their eyes also. Surely it would be a good thing if in every school throughout the country there were sets of objects illustrating the Geological character of the school's immediate neighbourhood.

And again, I have had so many specimens of moths, butterflies and beetles brought to the school, that it has become necessary to have one wall-case entirely devoted to entomological objects. Different portions of the cupboard are set apart and labelled to receive the various classes of insects. Of course the Lepidoptera (moths and butterflies) occupy the largest space. About thirty specimens here, are over the following label: 'Moths and Butterflies from the neighbourhood of Madras; presented to this museum by Edgar Pugh, late of Standard V.' We have also a great many coleopterous insects (beetles). As the boys usually bring living specimens, we have to keep a bottle of cyanide of potassium handy, as well as two or three cork setting-boards and a stock of pins.

There are numbers of articles, however, which cannot be placed in any of the wall cases; air-pumps, electrical machines, gas-jars, large bottles of acids and other chemicals, and things used to illustrate the lessons on mechanics. I have had shelves put up in my private room for these, and some of the more valuable ones have to be placed under lock and key.

It may be asked, 'How can so large a collection be obtained?' Let me answer this question. In the first place it must be remembered that all these various specimens have taken some considerable time to get together—about twenty-five years. Some of the objects I have purchased and used to illustrate my lessons in connection with the Science and Art Department. Many others have been contributed by the fathers of the boys; for it is well known that there is a museum in the school. Most of the fossils and rocks from our neighbourhood have been sent by people who had them scattered about their back gardens without knowing what they were until they read my articles in the local papers, or attended my public lectures upon the 'Geology of Peckham.'

I have been singularly fortunate in obtaining mineral specimens. One of my old boys, a bright boy, but so poor that the minister of Hanover Chapel had to pay his school fees, followed up his studies after leaving school, and is now inspector and surveyor of mines in North America, being employed by some London mining companies. He has contributed many specimens of gold, silver and copper ores. Another boy became manager of coal mines near Nottingham. He has sent me most of the coal and carboniferous limestone fossils.

Several boys have 'gone to sea.' No less than four have become first or second mates. When any of these young men come to the Port of London, they invariably pay us a visit, and generally bring something 'from foreign parts.'

The specimens of cotton, wool, flax, hemp, etc., are brought mostly by the teachers, who, of course, think of the museum when they take their summer holiday. Then I must not forget the managers. Some of the most useful objects are contributed by them. When any of these ladies or gentlemen visit the school, I take them round and show them—especially if they are newly-appointed managers—the endless array of things in the glass cases. It interests them; it impresses them with a due sense of the enormous number of things they have to learn, and which we at the school know all about; and besides all this, it keeps them from prying into matters which we feel do not concern them.

Of course, we are continually getting a number of utterly useless things—mere curiosities. If I refuse to accept these I offend the giver, and lose the chance of future favours of a more substantial character. We never refuse anything; but we reserve the right of selection.

ELEMENTARY LESSONS IN AGRICULTURE.

BY PROF. GREEN,

Examiner in Botany to Cambridge University.

II.

The Formation of the Soil.

The science of agriculture deals with the principles which govern the cultivation of the soil. Let us first see, then, how the soil is formed. If you notice any old stone wall, you will see that some of the stone of which it is composed has crumbled away and become part of the surrounding soil. Now stone, you know, has been hewn from rock. The decay of mineral matter forms soil. Again, if you bury leaves in a heap of soil in the autumn, when the spring comes, you will find that they no longer exist as leaves, but your heap of soil is larger than it would otherwise have been. The leaves have become leaf mould, a rich kind of soil. The decay of vegetable matter forms soil. Again, if you bury bones like the dog, but unlike him do not dig them up, they will crumble gradually away and become part of the soil. The decay of animal matter forms soil.

We have said that rocks decay and become soil. The way in which this change is effected is very interesting. You have often heard people say 'as hard as granite,' but even granite becomes soil when it is acted on by two powerful gases contained in the air—oxygen and carbonic acid—by water, and by changes in temperature. Granite is partly formed of iron and potash, which enter into alliance with some of the oxygen and carbonic acid which water dissolves from the air. Little holes are thus worn away in the granite. Then when frost comes, the water which fills the passages thus made swells as it becomes frozen, and portions of the rock are seen to be crumbling away. This process goes on year after year till the rock is reduced to soil.

A great deal of soil has been formed by the action of the rivers and of the sea. Streams rise in high ground, often among mountains, and as they flow down to lower levels they carry with them a great deal of mineral matter worn away by their passage over the surface of rocks. This mud or *alluvium*, when the river overflows its banks, is spread over the surface of the surrounding country, and as the river widens towards its estuary or mouth it often deposits large tracts of alluvial soil. The land round the Humber has been formed thus. Some alluvial soil, however, such as Romney Marsh, is due not to the action of rivers but of the sea. There is a large flat tract of soil in Somerset which must have been formed by the deposit of mud from the Bristol Channel, for its inland boundary is a range of hills that, from the shells &c. found there, must long ago have formed part of the coast line.

We have seen what a powerful agent in breaking down rocks frozen water is. Ice and frost form a great deal of alluvial soil through the action of glaciers or ice rivers. As these ice rivers slowly descend, they grind particles from the rocks, which make the streams that perpetually run from the glaciers milky or turbid. Then on reaching the level land at the base of the mountain alluvial soil is deposited. In many cases this mud enters a lake where it sinks to the bottom. Many lakes have thus in the course of time become filled up with alluvial soil.

Volcanoes also form soil. The lava or stream of melted rock they throw out soon cools and cracks into a cindery porous mass which, under the influences of moisture and changes of temperature, gradually becomes a soil. The soil on which grow the vineyards and olive gardens that clothe the slopes of Vesuvius and Etna have been formed in this way.

Peaty soils are formed by the process of vegetable decay. A forest or tract of brushwood is levelled by wind or flood, stagnant water accumulates, and aquatic weeds and mosses grow and decay, their remains sinking to the bottom till a spongy mass is formed, on the surface of which a turfy growth establishes itself, which gradually makes the mass firmer and more solid.

Some soils remain where they were originally formed and are called *Sedentary* soils. Most of the soil of Great Britain belongs to this class, and rests on the parent rock. Other soils have been transported to the spot they occupy by the action of water or volcanic agency, and are therefore called *Transported* soils. Alluvial, lava, and peaty soils belong to the latter class.

To recapitulate:—We have seen

I. There are two primary divisions of soil: those formed by the breaking down of *rocks*, and those which are of *vegetable* origin.

II. The atmosphere, water, and changes of temperature are the natural agents to whose action the formation of soil is due.

III. Some soils remain where they were originally formed, and are called *Sedentary* soils.

IV. Some soils are transported by the action of water or other agencies, from the spot where they were originally formed, and are then called *Transported* soils.

III.

The Composition of the Soil.

We have already seen that soil is formed from the decay of rocks, and since rocks vary in their character, being made up of different materials, we must expect to find soils varying in their composition. All soils adapted for growing crops will be found, on examination, to contain five substances—sand, clay, lime, vegetable matter, and mineral fragments or stones. On the various proportions these ingredients bear to one another the kind and quality of any given soil depend.

Two of these bodies, sand and clay, are in many respects a complete contrast to each other. Sand, when it is stirred up with water, sinks very quickly to the bottom of the vessel in which it is placed. When wet, it is hard and gritty. Water passes quickly through it, and it dries quickly. Clay, on the other hand, when it is finely divided and thrown into a vessel of water, settles down very slowly. When wet, it is soft, and tough, and greasy. Water passes slowly through it and it dries slowly.

Since these bodies are so opposite in their nature, it is convenient to divide soils into groups according to the proportion of sand and clay they contain. At one end of the scale we get a *clay* group, composed of soils which contain about 50 per cent. of clay and not more than 20 per cent. of sand. Such soils are called 'tough' or 'obstinate,' and are difficult to work. We shall see, however, that under proper treatment they yield the farmer good crops. At the other end of the scale is the *sand* group, composed of soils which contain at least 80 per cent. of sand, and a very small percentage of clay. Such soils are called by the farmer 'hungry' soils, because rain passes quickly through them, and they have little power of soaking up and retaining the fertilising matter he adds to them.

We shall see that this is a fault capable of being cured.

Intermediate between the clay group and the sand group comes the *loam* group, composed of soils in which clay and sand occur in nearly equal proportions. Such soils the farmer finds easy to manage and he therefore calls them 'kindly' or 'grateful.'

Between the clay group and the loam group we can now insert another group—the clay loams—containing 20 to 40 per cent. of sand and a proportionately larger percentage of clay. Between the sand group and the loam group we get the sandy loams, containing 20 to 30 per cent. of clay and from 60 to 80 per cent. of sand.

The classification of soils we have just made is dependent on their texture, the particles of clay soils being very finely divided the particles of sand being much less so. We must notice in this connection that lime, humus, or vegetable matter, and stones, all influence the texture of the soils in which they are found. The presence of lime makes a clay soil freer and easier to work, while it makes a sandy soil closer and better able to hold water. Humus, or vegetable matter, is also a

valuable agent in modifying the texture of the soil, rendering it brown, cool, moist, and mellow, instead of light-coloured, powdery, and dry. Stones, too, modify the texture of the soil in which they occur. They render it more open and easier to work.

To recapitulate :—We have seen

I. That the texture of soils is influenced by the presence in them of five bodies : clay, sand, lime, humus or vegetable matter, and stones.

II. That according to the proportions of clay and sand found in them, soils fall into five groups (i.) clays (ii.) clay loams (iii.) loams (iv.) sandy loams and (v.) sandy soils.

III. That the texture of the soil influences its working.

IV.

The Soil in its Relation to the Plant.

If you have watched carefully the burning of a heap of weeds, you will have noticed that a small quantity of white ash is always left. This white ash represents that part of the plant which cannot be consumed—its incombustible elements. Besides su'phur, the ash contains always five elements, without which a plant cannot thrive. They are potassium, calcium, magnesium, iron, and phosphorus. A soil which does not contain these five substances and sulphur cannot grow plants.

Besides the non-combustible substances which form the ash left after a plant is burned, every plant contains carbon, oxygen, hydrogen, nitrogen, and sulphur. These elements pass away in the form of gas when the plant is burned, and are therefore said to be combustible. It is from the soil that plants derive their sulphur, nitrogen, hydrogen, and oxygen.

We are now in a position to see of what use the sand, clay, lime, vegetable matter and stones, found in the soil, are to the plant.

Sand is in no sense a plant food, but its presence in the soil helps a plant to make use of the food materials contained in the soil. It helps the water to percolate through the soil, makes the passage of roots in search of food easier than it otherwise would be, and renders soils warm and easy of tillage.

Pure clay again is not a plant food. This substance, however, seldom occurs in a pure form. The impurities with which it is mixed include substances which form valuable mineral food for the plant—potash, lime, ferric oxide, magnesia, &c. Besides the fertility these impurities of clay confer on the soil, the presence of clay enables a soil to retain moisture, and its coolness enables the soil to resist drought.

Lime is an important plant food, and with its impurities, oxide of iron, oxide of phosphorus, and sulphate of calcium, furnishes the plant with nearly all the elements which compose its ash. It is more tenacious than sand, less tenacious than clay.

Humus is not directly plant food, but it is a source of a very important element, *nitrogen*. Its presence in clay soils assists the roots of plants to penetrate the ground for their food, and, in the case of sandy soils, it lends the soil firmness, and thus enables manures and plant food to be held in it. The presence of vegetable matter also increases the power of any soil to absorb moisture from the air, and to preserve the moisture thus obtained, as well as that gathered from rain passing through it. This moisture it gives up to the growing plant.

Stones are undecayed fragments of rock which, when they crumble down under the influence of frost, warmth, and moisture, yield fresh mineral food for the plant.

It is important to notice that it is not the general mass of the soil which feeds the plants grown in it. Plants, as we shall see later, can only make use of such plant food contained in the soil as is soluble in water, or the weak acids produced by the action of water in the minerals contained in the soil. This soluble portion of the soil is called *active*, or available plant food. The remaining and far larger portion of the soil may be called a reserve store of plant food. It is said to be *dormant*, or sleeping matter. We shall see, when we come to consider the question of tillage, that this dormant matter is capable of being turned into active matter of which the growing plant can avail itself.

A soil well suited for growing plants is called a fertile soil. Let us see what are the conditions of fertility. It is evident from what has already been said, that such a soil is well stocked with active or available plant food, and possesses a good reserve store of plant food or dormant matter. It is necessary also that it shall be porous and moderately tenacious, and that it shall be favourably situated with reference to the *subsoil* or zone which lies immediately underneath the section of the soil which is cultivated. The fertility of soils is also largely influenced by climate.

Let us consider the last form of these conditions as we have the first two, and see how they are brought to bear upon the question of the growth of the plant. A soil is said to be porous when its particles are not too near together, so that air and water can pass freely between them. Moisture is absorbed from the atmosphere for the use of the growing plant, and valuable fertilising matters are kept in the soil, notwithstanding the tendency of the rain to wash them down beyond the reach of the plant. The porosity of the soil also influences what is called capillary attraction, which is an important factor in the supply of water to the plant. If you place a tube with a very fine bore, upright in a vessel of water, you will see the water will rise in the tube to a higher level than it reaches in the vessel, and the finer and more hair-like the tube, the greater will be the height to which the water will rise. The same sort of thing happens in the soil, but instead of the passages being tubular, they are irregular in shape, and their size is largely dependent on the fineness of the particles of which the soil is composed. You can see a good instance of the way the soil takes up water, by placing a piece of lump sugar in a very little water. The water is sucked up into the sugar by this capillary attraction. A supply of water is held in this manner lightly in the soil, which is of the greatest benefit to the plant in times of drought.

The tenacity of the soil depends upon the proportion of clay it contains; one that is too tenacious is difficult to cultivate and unfit for growing crops suitable for the winter food of cattle, but unless the soil possesses a certain amount of tenacity the entire mass of it may be gradually blown away. The nature of the *subsoil*, or section of soil immediately underlying the soil actually under cultivation, is of great importance because of the influence it exerts on the drainage of the surface soil. A tenacious clay subsoil requires thorough drainage for the superficial soil to yield good crops, while a very light subsoil secures the natural drainage of the surface, but allows the fertilising agents applied to the land to wash through beyond the reach of the roots of the plants.

Hard floors, or *pans*, often form under the surface soil from the treading of the horses and the passage of the plough-sole at one depth, and from the deposits of lime, which has a tendency to sink through the land. These pans prevent the roots of the plant from penetrating into deeper soil, and also interfere with the passage of air through the soil. It is, therefore, important that they should be broken up.

The importance of climate on the fertility of soils is seen, not only in the fact that each crop requires more or less a different climate for its perfect development, but also in the fact that the yield of our fields varies from year to year. But the question of climate will be better discussed when we come to consider the supply of plant food contained in the atmosphere.

To recapitulate:—We have seen

I. That certain mineral substances, potash, magnesium, lime, iron, phosphorus, and sulphur remain in the form of a white ash when a plant is burned, and that these are derived from the soil in which it was grown.

II. That the plant food contained in the soil is of two kinds:—*active* matter, which is immediately soluble in water and weak acids and is therefore ready for use, and *dormant* matter, which forms a reserve store of food for the plant.

III. That while sand, clay, and humus are not in themselves plant food, their presence enables plants to make use of the plant food contained in the soil. Lime and its impurities are important plant foods, and stones in their decay yield fresh mineral food for the plant.

IV. For soil to be fertile, it must be of a porous and moderately tenacious character. It must be well stocked with active plant food and possess a good store of dormant matter.

It must rest on a subsoil of a favourable character, and its fertility will be largely influenced by the question of climate.

(To be continued.)

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CONVERSATIONAL SCIENCE LESSONS.

BY DR. ROBERT STEELE, B.Sc. F.C.S.

Lesson VII.—A Candle.

Summary.—It produces light and heat by burning. In burning it causes an upward current of hot air. It is used up in burning. We may have the light without the heat.

Materials.—A candle in candlestick, a piece of glass, tissue paper.
(If the room can be darkened it will be an advantage.)

Introduction.—Obtain from class what they know of a candle—the names of different sorts of candles, which are the dearest, the cheapest? The two parts? Wick and wax. Unwind a piece of new wick—it is a plaited white string. The use of a candle? To give light. Other things that give light? Elicit that nearly all give light by burning.

I. Light the candle—call it setting the candle on fire, or burning the candle. Count up the parts now? Four. (1.) Flame. (2.) Wick. (3.) Melted wax. (4.) Solid wax. Which is the useful part to us? The flame.

II. Hold a screen of some sort (2 books, 2 slates, &c.) before the parts of the candle. The light comes only from the flame. If we screen all the rest of the candle it does not affect the light.

III. The flame gives out heat. Hold a piece of paper near the flame, it becomes hot. Where does the heat come from? The flame. Try all sides of the flame? Same result. Hold it (in a holder made of a pen-holder) six inches *over* the flame. It shrivels and chars. Why? Most of the heat of the candle goes upward.

IV. Hold a piece of tissue paper in the flame till it is burnt. Allow the ash to rise in the flame. It will rise some distance (near the top of the room), turn sideways, and gradually come down. Make the children describe this correctly before explaining it. What carried the ash up? Some will answer:—'The heat of the flame.' If so, enquire why the ash beside the flame is not carried a little way out since we have seen some heat goes that way. Hold your hand two feet above the candle, you feel hot air rising against your hand. This hot air carries the light ash up. If there is a piece of down near it will carry that up. Draw the room and the current of air on the board.

V. Bring back the class to the point that 'a candle gives us light and heat.' Write it on the board. Hold a piece of glass up beside the flame as close as possible not to touch. Hold the hand on the other side not to touch the glass. No heat is felt. Remove the glass. The heat is felt. The glass allows the light to go through, but not the heat of the candle. The light is different from the heat.

VI. While all this is going on observe that the candle has been using up the wax to give us light and heat. No wax used, no light, no heat.

Recapitulate.

Lesson VIII.—A Fire.

Summary.—Heat and light are produced, and the substance is used up. Burning uses up air. Why a grate is used for a coal fire. Fresh air. Ashes. Where the heat of a fire goes to.

Materials.—A candle end, a wide-mouth glass bottle, a lamp glass, a smooth plate, vaseline or tallow, basin of water.

If possible, this and the following lesson should be given in a room with a fire in it.

Introduction.—Recapitulate the last lesson. Write on the board: 'In burning a candle, heat is produced, light is produced, and the substance is used up.' What do we want when we burn a candle? Light. If we want heat what do we do? Light a fire. Let the class name some things we use for fires, *e.g.*, coal, coke, wood, peat, charcoal, &c.

I. The place where a fire is lighted. Do we light a fire anywhere—here, for example? No. Why? What is the place where we make a fire called? Fireplace. The bottom of the fireplace? Hearth. The holder of the fire? Stove, grate. Get the reason for calling it a grate. Because it forms a grating. Why must a grate be used? Why not a plate? We shall see.

II. Burning requires fresh air. Light the candle. Put the lamp glass over it and support it on three matches. Put the smooth plate on the top. The candle goes out. Take off the plate. Light the candle again

and cover with the lamp glass as before. It burns. Show fresh air is coming in by holding a flame to the bottom of the glass. Write on the board: 'Burning requires fresh air.'

III. Take a lighted candle end, set it on the plate, which must be well greased with vaseline (or tallow). Get a wide and smooth-mouthed bottle, rub its edges with vaseline. Put it firmly down on the plate over the candle. In a few seconds the candle will go out. After half-a-minute lift the bottle, put it in a basin of water and pull off the plate. The water will rush in with some violence and fill nearly a quarter of the bottle. Replace the plate, and put the bottle on the table. Question thoroughly and write on the board: 'Burning uses up air, and requires, therefore, fresh air to take its place.' One use of the grate is to let this fresh air in.

IV. When a candle is burnt up what is left? Nothing. Wood? Ashes. Coal? Ashes. Coke? Ashes. Which leaves most ashes? Coke. When we want a fire to burn up, what do we do? Poke it. Where do we poke it? At the bottom. Why? To let the fresh air in, and to let the ashes out. What do the ashes do? Fill up the grating.

V. Another thing we must have if we want a fire? A chimney. Why? To let out smoke. If we burn a candle what rises? Hot air? Is smoke hot? Where does heat of candle go? Where does heat of fire go? Most of the heat up the chimney. Use of stoves.

Recapitulate.

Where necessary, II. or III. may be omitted.

Lesson IX.—A Red Hot Poker.

Summary.—It gives out light and heat. It can set things on fire. It is not burning. It loses heat in two ways. Its heat came from the fire.

Materials.—A red hot poker. (A knitting needle stuck in a piece of wood will answer for most of the experiments. It can be heated to redness in an air gas burner.) Tissue paper. The air thermometer.

Introductory.—Recapitulate last lesson. Question as to where the heat of the fire may be felt. We can use heat at the sides, *e.g.*, Roasting; at the top, *e.g.*, Boiling. We can carry some of the heat away by making anything hot at the fire—example, a kettle, a red hot poker.

I. Hold up the poker. (This is best shown in a darkened room.) We can see it in the dark. What colour is it? Can we see a cold poker in the dark? As it cools the light disappears. It only gives out light when it is very hot. Write on the board: 'The poker gives out light when it is very hot.'

II. Hold the hand in various positions near the poker. We feel heat coming from it on all sides. Where is most heat felt? Above. Least? Below. Why? Repeat the experiment with the air thermometer. Write on the board: 'The poker gives out heat.'

III. Touch a piece of paper with it. It burns at once. Repeat the experiment with wood splints. Write on the board: 'It can set things on fire.'

IV. If a candle gives out light and heat, what else must be happening? The candle must be used up. Is the poker used up? No. Is it burning? No. Write on the board: 'It is not burning.'

V. Lay a piece of tissue paper on the poker. It burns and the ashes rise. What is taking them up? The air. Show that the air is hot, by feeling, and by the air thermometer. Where did it get its heat? From the poker. Then the poker is losing heat? Write on the board: 'The air takes some of the heat of the poker.'

VI. Make a little heap of match heads. Hold the poker over them, but not touching them. The matches explode. The poker sends out heat downward to them. Was it the air that carried it? No. Why? The hot air moves upward. Write: 'The poker sends out heat to everything near.'

VII. All this heat came from the fire. Why will not a cold poker do these things?

Recapitulate.

Lesson X.—Boiling Water.

Summary.—Gives out heat. Warms cold things. Gives out no light. How to cool it quickly. Effect of blowing on it.

Materials.—8 oz. flask, tripod stand and burner, cup, saucer, basin, air thermometer, spoon.

Introductory.—Set the water boiling in the flask. In the meantime recapitulate last lesson. Write on the board: 'A poker gets heat from the fire and gives out light and heat.' Refer to the water, question as to the effect of heat on it. Write: 'Heat makes water larger, and changes it into steam at last.'

I. Take the flask, cork it. It gives out heat on all sides. Show this by the air thermometer. Show it by holding the hands near it. If the room is darkened, can it be seen? No. It gives out heat and no light. If anything is giving out heat what else can you say of it? It is growing colder. Write: 'Boiling water gives out heat.'

II. Take a little cold water in the basin. Pour a little hot water into it. The cold water becomes hotter. Put a spoon into the boiling water. It becomes very hot. Where does the heat come from? Refer to hot water pipes.

III. Pour an equal quantity of hot water into a cup and a saucer. Get the class to describe what happens. Clouds of steam rise. Which cloud is bigger? That from the saucer. Why? Is there more water? No. There is just the same. It is more spread out. There is a larger surface. Which will cool first? The saucer. Explain that the hot water warms the air that is next to it, and that rises and takes away some of the heat. How is that shown? By the steam rising. Where does the steam come from? The water. What changes the water into steam? Heat. More steam requires? More heat. The water which gives up more heat becomes cooler. Write: 'The larger the surface, the quicker the water cools.'

IV. Blow on the saucer. Get the class to observe that the cloud is blown away and more steam is made. So more heat is used up than if the steam were not blown away.

Recapitulate.

(To be continued.)

DISMISSAL RHYME.

Words from 'Recitations, Rhymes, and Dialogues, for Infant Schools.'

(By kind permission of Messrs. G. Philip & Son, Publishers, Fleet Street, London, E.C.)

Cheerfully. *Music by* GEO. PHIPPS.

1st TREBLE.
2nd TREBLE.
BASS.
1. Our work - ing time is o - ver now, We're free to go and play; ..... But
2. Our work - ing time is o - ver now, And play - time is be - gun; ..... We'll
KEY B♭. *Cheerfully.*
let us try to bear in mind, The les - sons of to - day, ... For
make the best of eve - ry chance, For ex - er - cise and fun, ... But
fast the years are com - ing on, When we no more can learn; ..... When
let us have no cru - el tricks, No rude or naugh - ty way; ..... We'll
toil - ing hard from morn till night, Our liv - ing we must earn. .....
be both hear - ty in our work, And kind - ly in our play. .....

COMMON-SENSE LESSONS IN EVERY DAY HOUSEWORK.

BY MRS. E. A. SHARMAN.

(*Lecturer to the National Health Society.*)

Kitchen Work.

It is by a proper method, and never-tiring patience and forethought, that a girl learns to become a good housewife. Simple though the routine of domestic work may seem, each art requires a special knowledge. The lighting of a fire is an exceedingly simple process, if the method of doing it is first thoughtfully learnt. Most girls enjoy their first attempt at lighting a fire, and end by being much disappointed in the result. If a girl would try to understand that, in first laying a fire, she must be particular to arrange wood and coal in such a manner that air can pass through the pieces, she would then always get a fire to burn with the first lighting. She must use forethought in having the firewood dry to begin with, and method in building the mass so compact that it cannot give way in the burning. I will explain two ways of lighting a fire. The teacher will write the directions upon the blackboard. These, the girls must copy into their books; afterwards the method must be demonstrated, the girls copying the same into their books.

How to light a fire for Cooking, &c.—Half fill the grate with cinders, and, on the top of these, build a wall on either side of the grate with a few large pieces of coal to support the firewood, then put a few pieces of small coal at the back of the grate. Large pieces of coal at the sides do not give way so soon as small pieces would, but large pieces of coal placed at the back of the grate would not catch fire so quickly as small. When this is done, crumple some paper so lightly together that air can get amongst the folds, put it into the hollow centre, lay over it two rows of firewood crosswise, resting the ends on the walls of coal and top bar of the grate. Do not use more paper than will allow the wood to rest quite flat and firm. Choose small pieces of shiny coal; they catch fire quicker than dull looking coal. Arrange the pieces *on edge*, not flat, until the firewood is covered with coal, so packed that air can get amongst it. If the range is a Leamington or close range, draw the middle damper out for two or three inches, which will make a draught, and thus help the fire to burn slowly. If all the damper was pulled out there would be too much draught, causing the wood to burn away before the coal was well lighted. Now light the paper, and if more is needed to set the wood alight, it is easy to push it in between the empty bars and light it afresh. It is well to be at hand to give the fire a friendly poke in the beginning. Many a fire dies out at this stage of burning because it has been allowed to become hollow in the centre. The fire must be kept up by adding *small* pieces of coal from time to time. If the teacher is demonstrating upon a close range, she must explain to the girls that by removing the circle of iron which fits over the top of the oven—supposed to be used only when cleaning soot from the top—and filling the hollow with small pieces of coal, then replacing the iron plate, the oven can be heated much quicker.

To light a fire for warming a Room.—Fill the grate with cinders as high as the top bar, make a hole in the middle of the cinders large enough to hold the crumpled paper to be used for lighting. Take a piece of soft paper, such as old newspaper. Brown paper will not do. Crush it lightly into a ball, which will be full of crevices holding air. If the paper were folded flat, no air could get between the folds, and it would not burn. This is important to know when lighting a fire. Next arrange some thin dry pieces of firewood on the cinders crosswise, like latticework, which will support the coal when the wood is half burnt. Arrange the coal edge-ways upon the wood, pack the back and sides of the fire with cinders, and light the paper. The fire will burn *downwards*, and in two or three hours will be a red mass, free from flame, and if not poked will last two or three hours longer. The door of the room should be kept closed. This is an economical fire, and is also a capital method of making up a roasting or ironing fire in the kitchen grate. To mend the fire, draw the hot coals to the front of the grate by putting the fireshovel to the back and drawing the fire forward. Fill the empty space with some cinders, coke, or coal. By doing this, the fire can be always kept red, and never smoky. For keeping a fire in a kitchen grate during the night in case of sickness, or to save lighting in the morning, let the fire burn low and red, throw on as much coal, very small, as will reach a little above the top bar of the grate, press it firmly together with the poker, and pour over the top of the coal towards the back, a pint of cold water, then close the dampers and the door of the room. The fire will burn many hours if not poked. One halfpenny bundle of firewood will light four fires, if the wood is kept dry, and chopped into smaller pieces than when bought. If girls are made to understand thoroughly by questions and practice the right method of lighting a fire, much annoyance will be saved in after life. Nothing tries one's temper more than to have to deal with a fire that will not burn properly, or is 'smoky, especially in the morning. The firewood must be *dry*, and the coal in *small* pieces and dry also, or the fire when lighted will only smoulder. A candle must never be used to light with; it is a wasteful and dirty habit; nor a lamp, which is dangerous, and it is untidy to scratch matches upon a wall. As girls grow old they must begin to help mother; nothing would please her more than to know that her daughter could be trusted to light a fire and prepare breakfast. A quick girl can be very helpful; and in giving a helping hand at home a girl insensibly learns the rudiments of housekeeping. After a fire is lighted in the morning, the hearth will need cleaning, and perhaps the kitchen. When the kitchen is used as a living room as well as a workshop, much comfort can be ensured, and time saved, by cleaning it in the morning.

To clean a Hearth.—After lighting the fire, put the box of matches safely away in its right place, and wash your hands, or the handle of your sweeping brush will become very dirty, and you will also leave fingermarks on everything you touch. Sweep up all ashes gently, making as little dust as possible. Sift the cinders, which could be put upon the fire at once if liked or put aside to make up an ironing fire. Before lighting the fire, the grate will of course have been polished, according to the directions given elsewhere for cleaning a kitchenrange; the fender must be blackleaded in the same manner, and the fire irons polished with emery paper, and put on one side. Sweep the floor, and put the kettle on to be boiling while you wash the hearth. Take a flannel, and a pail of hot water with a little soda in it, and wash the hearth all over, taking care not to wet it too much if

made of concrete. Wring the flannel out of the water and wipe the hearth dry; then rub it all over with a hearthstone; wash the flannel again and wring it out of the hot water, fold all edges inwards, smooth the hearth over, rubbing lightly rubbing in one direction. Wash round the edges with clean water, so as to remove stains of hearthstone, and when dry, put the fender and fire irons down; shake the hearthrug and put it into place. Put all materials back into their proper places, after taking the dirt up neatly into a dustpan; this you had better put upon the fire, and in fact any kind of rubbish had better be burnt always, for heaps of such spoil the air we breathe and so help to make us unhealthy. If the floor is covered with oilcloth, and not very dirty, dry-rubbing will clean it. Floorcloth should be wetted as seldom as possible, and when it is done, should be thoroughly dried, or it will rot. When it must be washed, a little warm water with extract of soap dissolved in it, and a soft flannel, may be used. A fine polish can be got upon it by rubbing last with a little milk or melted bees' wax, using a soft dry cloth to rub with; but a high polish upon a kitchen floor is dangerous because it is very slippery.

To dust a Room—Put all articles of furniture back into their place as you dust them. Take a soft dry cloth, begin at one part of the room and dust everything in order until you come round to the part where you began. Do not neglect the legs of tables and chairs, or any part out of sight. Wipe firmly the ledges of doors, windows, shutters, and skirting. Shake your duster often in the open air, and do not flap it about too much. The object of dusting is to take the dust entirely away, and not merely to move it from one part of the room to another. Use a brush made of long feathers for removing dust that is beyond reach. Do not forget to dust the inside panes of the window.

If a girl wishes to save herself trouble, she will be careful to avoid all slops, splashes, and dirty finger and foot-marks; to remove all stains or soils as soon as they are made; and to remedy all little upsets or accidents as soon as they occur. All this requires forethought and a little management. A girl's only chance in learning anything useful lies in herself. It is by slow degrees and many mistakes that she generally acquires efficiency. An unpractised hand drops her brush, knocks her knuckles, and leaves many a dim spot; but all can be overcome by patience and thought and care. Work must also be done quickly to ensure good results.

(To be continued.)

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RECREATIVE BOTANICAL PAPERS.

BY PROFESSOR J. R. GREEN, M.A.

Examiner to the University of Cambridge.

II. August.

On examining the flowers we gathered last month from field and hedgerow, we found that the largest class of flowering plants—Dicotyledons, or plants with two seed leaves—comprises four sub-classes or divisions, Thalamifloræ, Calycifloræ, Corollifloræ, and Monochlamideæ.

It is with the first of these divisions that we will occupy ourselves this month. Armed with trowel and our rough and ready vasculum, the tin box, we will first get a han'ful of crowfoot or buttercups from the meadow. The kinds we shall be likely to find in flower this month are the celery-leaved crowfoot, the lesser spearwort, and the creeping buttercup, all of which grow in moist meadows and by the sides of ditches. The spearwort has narrow, undivided leaves, and an upright stem; the celery-leaved crowfoot has smooth glossy leaves with oblong divisions, and its carpels, as the curious little nearly oval bodies in the centre are called, form an oblong head; while the creeping buttercup has a creeping root, which makes it a very troublesome weed. We must secure some specimens of these three plants in the bud, others fully out, and yet others with fruit fully formed. Now let us take some of the poppies which make the cornfields so gay, and in the dusty hedgerow, or by the narrow brookside, we may find a little yellow-flowered plant with dotted leaves, known as the St. John's wort. We may find too the showy plant with purple flowers, which has the little flat fruit the country people call "cheeses," whose proper name is the mallow. If we can get some white or yellow water lilies from the side of the river we shall find it interesting to compare them with our other flowers.

These will be sufficient for us to make a beginning with, for we wish to examine them more closely than we did our parcel last month. Arrived at home with them in good condition, we will apply to their consideration what we learned then. To begin with the leaf,—they are all plants with net-veined leaves. Next to take the parts of the flower. The crowfoot, spearwort, buttercup, yellow water lily, mallow, and St. John's wort have their parts in fives. The white water lily has four sepals, but a large number of petals—indeed, the two classes of leaves pass frequently so gradually into one another, that it is hard to tell which is which. The poppy has two sepals and four petals, though as the first named fall over very early, perhaps you will miss them unless you look at the buds. The number in the flower therefore in both these is not three, or a multiple of three, and their leaves are net-veined, so that we shall be right in placing them with the other flowers we have gathered in the great division of Dicotyledons.

The next point we have to notice is what is called the *cohesion* of the sepals and of the petals. By this we mean, are the separate sepals free from each other, or are they partially or wholly joined together to form a cup? The cohesion of the petals will be understood similarly, and the petals are more important for purposes of classification than the sepals are. At the same time we must ascertain the position of the stamens; *i.e.*, from what part of the flower they appear to spring. In all our flowers the petals can be taken off separately, and they are therefore called *free;* the stamens spring from close to the top of the flower stalk, which you will remember we called the *thalamus.* We therefore have no hesitation in saying that they all belong to the sub-class Thalamifloræ; they are *thalamifloral plants.*

If you look again at our flowers you will see that they all have a very large number of stamens, more indeed than you can conveniently count. These are said to be indefinite in number. You must not however think that we can put them all in one group on that account, for there are too many differences between them when we come to examine them more closely to make this advisable.

The smaller groups of Thalamifloræ which we shall try to divide our flowers into are called Natural Orders. They include plants which are much more alike than the

large mass we examined last month, and the differences which we select to guide us in this nearer arrangement are concerned with the flower rather than the whole plant.

Let us first take the St. John's wort and look carefully at their cohesion, or state of union or freedom from one another. They are found to be arranged in three or five bundles, or brotherhoods, and are so called *polyadelphous*. This characteristic marks them off from all the other flowers we are examining, and it is one of the leading marks of the natural order *Hypericaceæ*. The dotted leaves are also always to be met with in this order. If we take a flower from which the sepals and petals have dropped, we shall see that the St. John's wort has but one ovary or seed vessel.

Let us look now at the poppy. The sepals are free, and are two in number. They fall off so early that if we look at a flower which is open they will be gone. We must have a bud as well as a full grown flower. The petals are free, four in number, and in the bud are crumpled up very closely together. The stamens are free and spring from the upper part of the thalamus. There is only one ovary, which is rather large and bears a curious rayed cap. If we cut this ovary transversely through about the centre we shall see that it has but one chamber or cell, but that some curious projections grow in towards the middle of this from the outside walls, and that on these are attached the seeds. These are the marks of *Papaveraceæ*, the natural order to which the poppy belongs. It is an important order, because it contains the opium poppy, the fruit of which yields a white milky juice from which those invaluable medicines opium, morphia, and laudanum are obtained. The pretty garden flower, the eschscholtzia, belongs to this order. A fruit like that of the poppy, which is made by the union or cohesion of several carpels, and which splits open in various ways when ripe, is called a *capsule*.

We will next examine our mallow. The calyx is made up of five sepals which are valvate; *i.e.*, when in the bud they touch each other by their edges, but are not folded so as to overlap each other. There are three little green leaves lying quite on the back of the calyx, forming what is called an epicalyx, which is a feature of all the mallow plants but one. The numerous stamens are springing from the thalamus as before. We might now begin to use the term which is generally employed to express this position. When the stamens spring from under the ovary as these all have been seen to do, they are said to be *hypogynous*. Our mallow has therefore hypogynous stamens. Their peculiarity, however, is that they are monadelphous, or united by their stalks into *one bundle*. It belongs on this account to the natural order *Malvaceæ*. The fruit has several carpels, which are arranged in a circle round a convex centre. If you cut it across there is not found a single cavity as was the case with the poppy, but each carpel can be seen almost independent. The French dry the flowers of the mallow and prepare a drink called 'tisane' from it, which they use as a cure for headache and feverish colds. Cotton, Indian hemp and Cuba bast are obtained from plants belonging to Malvaceæ, and a species of rose mallow, the juice of which is used by the Chinese ladies for dyeing their hair and eyebrows, is called in Java the shoeblack plant, because its juice is used there for blacking shoes. The most showy member of this order which we find in our gardens is the *hollyhock*.

Our creeping buttercup, lesser spearwort, and celery-leaved crowfoot, from the fact of their having indefinite hypogynous stamens and carpels wholly distinct from one another, belong to the order *Ranunculaceæ*, the crowfoot family, which is very interesting to us as containing many favourite garden plants. Some of their number, such as the clematis and anemone, are ornamental even in their wild state. The pæony, the monkshood (whose root yields a poison which is used in very minute quantities to reduce fever), the yellow flowered little winter-aconite, which comes out into bloom even before the snowdrop, the showy king-cup, the larkspur, the pretty columbine, and the globe flower, all belong to this order. It is interesting to note the different forms of fruit in these plants. In the buttercups and crowfoot, the clematis and the anemone, it consists of several dry one-seeded carpels which never open. These are called *achenes*. Those of the clematis have long feathery tails, which give the plant its popular name of old man's beard. The fruit of the pæony, the marsh marigold, the larkspur, and the monkshood consists of separate little boxes or follicles, which open by the seam, or *suture*, which faces the centre of the flower.

We have now to determine the natural order to which our water lilies belong. Like the other flowers we have examined, their sepals and petals are free, and their stamens are hypogynous. We cannot place them in Ranunculaceæ, because their carpels are not free. They are more like the poppy, but they have more than two sepals and their sepals do not fall off early, but are persistent. Again the petals, like the stamens, are very numerous, and water lillies are floating water plants. They belong to a natural order which in many respects resembles Ranunculaceæ, and in others approaches Papaveraceæ, and is known as *Nymphæaceæ*. The flowers of the yellow water lily are used by the Turks in the manufacture of cooling drinks, and the French use the root stock of the white water lily to prepare a kind of beer.

On looking through the plants we have finished refering to their natural orders, we have already noticed that they all have an indefinite number of stamens. We must not however suppose that all Thalamifloral plants are like them in this respect. All Thalamifloræ do however agree in having the petals *free* and the stamens *hypogynous*.

Starting out again on another day during the month, we will dig up from the roadside some chickweed, some bladder campion, a plant or two of the little white weed the shepherd's purse, of which birds are so fond, a few specimens of the dust-attracting hedge mustard, and some of the pretty little Herb-Robert, or wild geranium. These are common and not very attractive, but we shall see that we grow many of their relations for their beauty.

With our hedge-mustard and our shepherd's purse we will examine some of the single stocks which may still be found in the garden. They all have the free petals and hypogynous stamens which are the marks of the thalamiflorals. The stamens are not indefinite in number, but are six—four long ones very near the middle of the flower, and two short ones rather more towards the petals. This arrangement is called tetradynamous. We can see it best in the larger flower of the stock. The petals are four in number, and are very prettily arranged in a regular cross-like fashion. This arrangement of stamens is peculiar to a very large and important order called *Cruciferæ*, which derives its name however from the appearance of the petals. The sepals are also four in number. There being four sepals and four petals,

we should think that if the flower were regular there should be either four or eight stamens. But we see there are six. There have been many attempts made to explain this curious arrangement, but with them we have nothing to do at present.

Cruciferæ is a very interesting order to us, because a very large number of our most important vegetables belong to it. It includes in its members the cabbage, kale, brocoli, turnip, radish, and cress, and among our garden plants the wall-flower, honesty, candytuft, and others.

The chickweed and the bladder campion may be separated from the other thalamifloral we have examined by the character of their stem and leaves. The *nodes* or points on the stem from which the leaves spring are *tumid* or swollen, and the leaves spring from the stem two at each node, which are opposite to each other. They are simple or undivided leaves, and have no leafy appendages or stipules at their base. They belong to the *Caryophyllaceæ*, a natural order which includes several favourite garden flowers, the pink, carnation, sweet-william, picotee, and scarlet lychnis. The flowers show that the stamens are free and twice as many as the petals, which, like the sepals, are five in number. The sepals in the chickweed are free, but in the bladder campion they form a bladder-like inflated cup. The petals in both have long claws. The ovary will remind you of the ovary of the poppy. It is single in the centre of the stamens, and if cut across will be seen to have only one cavity or cell, which contains a great many seeds. These are not however, as in the poppy, attached to the wall of the capsule or to ingrowths from it, but they seem to be attached to a central axis or prolongation of the stalk which rises from the bottom of the ovary, but does not touch its walls anywhere. Such a mode of attachment of the seeds, or placentation, is known as *free central*. The placentation of the poppy is called *parietal*, because the seeds are attached to the wall of the ovary.

With Herb-Robert we may examine one of the popular bedding-out plants, the garden geranium. The former has five sepals, five free petals, and ten hypogynous stamens; the latter has seven stamens, also hypogynous, three being suppressed. The natural order *Geraniaceæ*, to which these plants belong, is readily known by the long beak which marks the fruit. The name crane's bill or stork's bill, given to certain of the wild plants of this tribe, is thus accounted for.

We have now determined the characters of the leading thalamifloral orders. Before summarising the knowledge we have gained we will consider how we may best preserve our plants for future reference. It is not a difficult matter to form a small herbarium or collection of dried plants, and such a collection is as interesting as it is useful.

As soon as possible after bringing them home you should spread out specimens of the plants you have dug up between layers of newspaper, taking care to straighten out all folds and crumpling of the leaves and petals, and to arrange the plants as naturally as possible, so as to show the method of growth, whether erect, creeping, &c. Both sides of the flowers and leaves should be shown, and if you cannot find a specimen which has on it both buds and the ripe fruit, you may have to gather other specimens to display these important points. When you have arranged a good pile of specimens, with several layers of paper between every two sheets of plants, you must dry the plants by applying pressure. This may be done in various ways, such as by putting heavy books on them, or boxes filled with stones, but you must be careful to make the pressure as uniform as you can. To preserve the colour of your specimens and prevent their moulding, you should change the papers between them at least once a day for the first four or five days, and afterwards every other day till they are thoroughly dry. If the plants when placed against your cheek strike cool, they are not dried enough.

We will suppose that your plants are nicely dried. They should now be carefully mounted on sheets of white cartridge paper about 16½ inches by 10½ inches in size. They may be either fastened down by narrow strips of gummed paper, or gummed bodily to the cartridge paper. The latter is the more secure plan, but it is difficult to do neatly.

We will assume that all the wild plants we have discussed this month, and as many of their garden relatives as we have been able to obtain, have been nicely mounted and their names clearly written, and are before us waiting to be arranged in their respective natural orders. We will first cut eight sheets of brown paper, rather more than twice the size of the cartridge paper sheets, and fold them down the middle. Their use you will see presently. Now, sorting our sheets, we find that we have three wild plants, the creeping buttercup, the celery-leaved crowfoot and the lesser spearwort, which have *free petals, indefinite free hypogynous stamens, and carpels wholly distinct from each other*. These are the marks of Ranunculaceæ, and we will enclose our three sheets in one of the brown paper sheets, in which we will write *Ranunculaceæ, the crowfoot tribe*. As the months roll on, we shall be able to collect, press and mount the other plants we have mentioned as belonging to this order, and place them too in this brown paper wrapper. Our St. John's wort is the only plant to go at present into our second brown paper sheet, which must be labelled *Hypericaceæ, the St. John's wort tribe*, plants with free petals, and polyadelphous hypogynous stamens.

The third brown paper sheet contains the mallow, and if you can get it, the single hollyhock. The label is *Malvaceæ, the mallow tribe*, plants with valvate sepals, free petals, and monadelphous hypogynous stamens.

The fourth contains the poppy and the escholtzin, if you can get one, and must be marked *Papaveraceæ, the poppy tribe*, plants with two free sepals, four free petals, numerous hypogynous stamens, and a one-celled ovary, whose placentation is parietal.

The fifth contains our water lilies, and is named *Nympheaceæ, the water-lily tribe*, water-plants with persistent sepals, numerous free hypogynous petals and stamens.

The mustard, shepherd's-purse, and stock are placed in the sixth sheet, labelled *Cruciferæ, the crucifer tribe*, plants with free cruciate petals, and tetradynamous hypogynous stamens. You will be able to add several plants to this order if you notice when the vegetables we have mentioned as belonging to it flower.

The seventh sheet contains the chickweed and bladder campion, and probably you can add to them the sweet-william. The sheet must be marked *Cucyophyllaceæ, the pink tribe*, plants with humid nodes opposite undivided leaves without stipules, free petals, free hypogynous stamens and an ovary with free central placenta.

Our eighth and last sheet contains the wild herb Robert, and the garden geranium. It is marked *Geraniaceæ, the geranium tribe*, plants with free petals, free hypogynous stamens and a beaked fruit.

The plants belonging to these eight orders you must remember are all thalamifloral dicotyledons. You would find it interesting to make a list of the useful and ornamental plants belonging to each order on the sheet which bears its name.

(To be continued.)

SCHOOL MANAGEMENT, AND PEDAGOGIC TRAINING.

BY DR. GEORGE BEACH, M.A.,

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CHAPTER III.

TRAINING OF THE BODY.

Necessity for such Training.

Taking as granted the intimate connection between the Body and Mind, and therefore between corporeal and mental training, there also remain numerous and important considerations which necessitate the true educator having a knowledge of his pupils' bodily constitution.

In the case of the vast majority of animals, the parents themselves devote much of their time to the education of their offspring. By great personal labour, by almost constant presence, by the teaching of the usual habits, and by the selection of proper environments the parents most sedulously promote the comfort, growth and probability of existence of their offspring.

Nature, too, has given to each ordinary animal its proper habitat and instinct, and by narrowing the objects and pursuits of mature existence has provided the adult creature with parental leisure.

But it is far otherwise with the rational animal. He is so busily occupied that in great measure he delegates the care of his young to others; and he is often so ill-informed, so unfortunate in his surroundings, and so constrained in means, that his children are most unfavourably placed as regards bodily progress. Thus the training of the body neglected at home is all the more necessary at school.

Herbert Spencer says, 'The fact seems strange that while the raising of first-rate bullocks is an occupation on which educated men willingly bestow much time and thought, the bringing-up of fine human beings is an occupation tacitly voted unworthy of their attention.'

In connection with this we may remark that those philanthropic teachers of half-starved children who have instituted for these neglected ones 'Penny or Free Dinners,' have not only been pitiful but wise in their day and generation.

Undoubtedly the resulting increase in mental vigour must have greatly compensated them, by decreasing the toil of instruction, for their labour of love.

'The ill-fed Hindoo goes down before the Englishman fed on more nutritive food; to whom he is as inferior in mental as in physical energy. And generally, the history of the world shows that the well-fed races have been the energetic and dominant races.' (Herbert Spencer.)

Moreover, as all knowledge is received through the senses, and transmitted to the brain through the nervous system, a correct, even if comparatively superficial, knowledge of nerve and cerebral action is highly to be desired.

As early as 1658 the importance of the training of the senses was thus strongly insisted upon by Comenius:—

'We can neither act nor speak wisely unless we first rightly understand all the things which are to be done, and whereof we have to speak. Now there is nothing in the understanding which was not before the sense. Therefore, to exercise the senses well about the right perceiving the differences of things will be to lay the grounds for all wisdom and all wise discourse, and all discreet actions in one's course of life.'

Necessity of Physiological Knowledge on the Part of the Teacher.

Besides the considerations of the foregoing section, other facts may be adduced to show the imperative need of some physiological knowledge.

The teacher is not only the director of studies, but also the moral trainer, the guide to æsthetics, and the caretaker of the body.

As a trainer of morals, he should know how certain offences, such as lying and cruelty to animals, frequently proceed not from innate vice but from the corporeal condition. Lying is often produced through fear, induced by a susceptible nervous organisation, and cruelty to animals through thoughtlessness, engendered by perfect health and freedom from, and therefore inappreciation of, pain. As a dispenser of rewards and punishments for moral progress or delinquency, the teacher must often primarily consider the physiological condition of the meritorious or the culpable.

Many rigid teachers who pride themselves upon even-handed justice, and whose maxim is 'The same punishment for the same offence,' would do well to study the following extracts from 'Bentham's Theory of Legislation':—

(*a*) 'When the sensibility of the offender is essentially different, the same nominal punishment is not the same real punishment.'

(*b*) 'The same nominal offence is not in fact the same real offence when the sensibility of the injured individual is not the same. A corporal injury, which if done to an invalid would put his life in danger, would be of little comparative consequence to a person in full health.'

(*c*) '*The same punishments*, it is said, *for the same offences*. This adage has an appearance of justice and impartiality which seduces the superficial observer. An inflexible law would be doubly vicious, at once inefficacious and tyrannical. Too severe for one, too indulgent for another; always failing through excess or deficiency, under the appearance of equality, it conceals an inequality the most monstrous.'

As a guide to æsthetics and a regulator and developer of the emotions, every teacher is compelled to study the bodily conditions of his pupils. Great harm may be done by the emotions being too intensely excited.

As a caretaker of the body, a proper understanding of the more ordinary physiological processes, such as respiration, perspiration, circulation of the blood, and digestion, is essential.

A little anatomy is also useful in order properly to regulate school exercises and recreations, to vary the work, and to select suitable desks and other apparatus.

We have not hitherto mentioned the subject of casualties, such as bites, burns, scalds, cuts, fainting, bleeding of the nose, &c., for all of which the teacher should be fairly well equipped, ready for emergencies.

CHAPTER IV.

THE SYSTEMATIC ORGANISATION OF THE BODY.

The study of Physiology includes the manifestations of life as presented by the vegetable as well as the animal world. Here we shall limit ourselves, however, to the study of Human Physiology. The body of man obviously consists of a number of parts or *organs;* it is, therefore, said to be organised.

Each organ has some special office or use assigned to it; this is termed its *function*. Thus the lungs are the organs of breathing, or respiration; the teeth are the organs of mastication; the eye is the organ of sight; while the function of the heart is that of circulation—the distribution of the blood over the various parts of the body, in order to supply them with nourishment.

Before we commence the proper study of the functions of these several organs, it is necessary to have a definite idea of their arrangement and connections with each other. This is taught us by the science of *Anatomy*. One branch of Anatomy, called *Histology*, busies itself with the appearances of the organs, as shown by the magnifying powers of the microscope—in other words, with the *structure* of the organ.

The simple structures are termed *tissues*. Thus we have bone or osseous tissue, muscle or muscular tissue, nervous tissue, and the like. An organ is not necessarily made up entirely of one kind of tissue. An ordinary muscle of the body, for instance, contains muscular tissue, nerves, blood vessels, and a structure which binds these several parts closely and completely together, termed *connective tissue*.

The *organs* may be grouped together to form systems. Thus the functions of digestion are presided over by the digestive system of organs, including the teeth, salivary glands, stomach, and intestines. Of these systems we may enumerate several, thus:—

1. *The motor organs*, including the bones and the muscles which move them.
2. *The digestive organs*, already mentioned.
3. *The lymphatic system*, or the organs of absorption.
4. *The heart and vessels* forming the organs of circulation.
5. *The respiratory system*, including the lungs.
6. *The organs of excretion*, including the skin and kidneys.
7. *The nervous system*, including the brain and spinal cord, with the nerves and organs of sense.

The Chemistry of the Body.

The earth itself, and all that therein is, has been shown by chemistry to be composed of a certain number of simple bodies or *elements* as they have been termed. All substances are made up, therefore, of one or more of these elements. The diamond, for instance, is almost pure carbon. Water is not a simple substance, but consists of the two elements—hydrogen and oxygen. The human body itself contains fourteen elements variously combined. Of these fourteen there are four which are the most important, namely, oxygen, nitrogen, carbon, and hydrogen.

Oxygen, as obtained in a pure state, is a transparent and invisible gas. In combination with hydrogen it forms the water we drink; mixed with nitrogen, it constitutes the air we breathe, and forms the most important element of the air, since, when absent, suffocation at once follows. It is usually prepared by heating red precipitate, or oxide of mercury, or by heating chlorate of potassium mixed with oxide of manganese. On plunging a taper into a jar containing oxygen the taper burns much more brilliantly than in air, but the oxygen itself does not burn; that is, while it *supports combustion* much better than air, like air, it is not inflammable. All substances such as sulphur, wood, &c., which burn in air, burn with increased brilliancy and rapidity in oxygen. It can be respired when pure, and supports life; hence, it was called *vital air*. Water takes up a certain amount of oxygen from the air, and this meets the requirements of such aquatic animals as do not come to the surface to breathe. The chemical symbol is O.

Hydrogen (symbol H), is one of the elements of water, hence its name. When strips of zinc are added to a solution of hydrochloric acid, a gas is given off from the surface of the liquid, which is hydrogen. It is a colourless gas, exceedingly light, being sixteen times lighter than oxygen. When a light is put to it the gas burns with a blue flame, and at the same time, combining with the oxygen of the air, produces water.

Carbon (symbol C) is a solid element which may exist in several forms. The *soot* deposited on the ceiling by a smoky lamp, the light porous *charcoal* prepared from wood, *black lead* used in the manufacture of pencils, and the hard and brilliant *diamond* are all forms of carbon. Carbon has a powerful attraction for oxygen, and when charcoal is burnt in air carbonic acid is the result.

Nitrogen (symbol N) is one of the elements of air, and may be obtained from it by removing the other element—oxygen. Out of every 100 parts of the atmosphere there are 79 nitrogen and 21 oxygen. The oxygen may be removed by burning a small piece of phosphorus in a closed space of air. Nitrogen is a colourless gas which will neither burn itself nor will it support combustion; in other words, a lighted taper is at once extinguished on being plunged into a jar containing nitrogen. Nitrogen is the essential constituent of flesh, of nerve, and of the blood. Animals quickly die in it from a want of oxygen.

The air we breathe is a mixture of the gases *nitrogen* and *oxygen* in the proportions we have already mentioned. The presence of nitrogen serves to moderate all chemical actions which depend on the activity of the oxygen. *Carbonic acid* is also present in the air to a slight extent, about four parts in every 10,000 parts of air.

Water is a chemical compound containing *hydrogen* and *oxygen* in the proportions H_2O. Any substance which possesses a greater attraction for the oxygen will unite with the latter and set the hydrogen free. Thus sodium, when placed on water, decomposes it. Water freezes and becomes ice at the freezing point (0° Centigrade; 32° Fahrenheit), and boils at 100° Centigrade, that is 212° Fahrenheit.

Ammonia is a gas with a strong pungent smell, which readily dissolves in water, forming a solution of ammonia as sold by the chemist. Red litmus paper is turned blue by this solution. Such bodies as turn red litmus blue are termed *alkalis* or *bases*. Among these also are *potash* and *soda*. Other bodies turn blue litmus red, and are termed acids; for instance, hydrochloric, sulphuric, and nitric acids. Whenever animal matter, as *bone*, *hair*, *flesh*, is burnt or decays, a certain amount of ammonia is produced. Ammonia contains the elements nitrogen and hydrogen in the proportion of 1 to 3, hence its symbol or chemical formula is NH_3.

Carbonic acid, or Carbon dioxide (CO_2), is the gas contained in effervescing drinks. In the case of soda water the gas is pumped into it under pressure, and the bottle tightly corked. When the cork is withdrawn, the gas is given off again, and produces the well-known appearance. Carbonic acid is *heavier* than air and oxygen. It can be readily prepared by placing bits of *marble or chalk* in a tumbler, and pouring over them some *hydrochloric acid*. After a few minutes, plunge a taper into the space in the tumbler above the liquid, and it will be extinguished, showing that carbonic acid neither supports combustion, nor does it burn. It is largely present in the air we breathe out. A simple experiment proves this: thus, if a small glass tube be dipped into a solution of lime water (CaO) and one blows a few minutes down the tube, the expired air bubbles through the lime water, and a cloudiness or precipitate is produced, since the carbonic acid of the breath has combined with the lime water, and has produced carbonate of lime ($CaO + CO_2 = CaCO_3$). This is our original marble or chalk, since both marble and chalk consist of the same compound, carbonate of lime.

Carbonate and phosphate of lime are both constituents of *bone*. If bone be burnt in the fire there is often left behind a model or cast of the bone in ash, which consists of carbonate and phosphate of lime, there being about three times as much phosphate of lime as carbonate. Bone also contains animal matter as well as mineral matter. The fire in the above experiment has destroyed the animal and left the mineral substances. If the thigh bone of a rabbit be placed in dilute nitric acid (aqua fortis), and left for a few days, it is found to have become quite soft, and is easily bent. In other words, the nitric acid has dissolved the salts (carbonate and phosphate of lime) out of the bone (which rendered it hard) and left the gelatin, which is soft and flexible.

(To be continued.)

CONVERSATIONAL DRAWING LESSONS FOR INFANTS.

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The Horizontal Line.

In last month's issue the drawing patterns consisted of vertical lines of different lengths.

These were placed in different positions so as to vary the exercise of drawing vertical lines. This change of position, while preventing weariness on the part of the children, helps to form habits of attention and thoughtfulness and gives additional exercise in number.

Vertical lines of three squares in length having been well practised, it is now advisable for the children to commence the horizontal lines of one, two and three squares before attempting to make the longer vertical ones.

On examining the patterns it will readily be noticed that the same idea is worked out as with the vertical lines, lines of one square being taken first and placed in different positions on the chequered paper in order to get the necessary variety. These are followed by lines of two and three squares respectively, the series concluding with combinations of the different lengths.

Sketch of a Lesson on Horizontal Line.

Apparatus. The children must be provided with chequered slates, and the teacher with a blackboard similarly ruled.

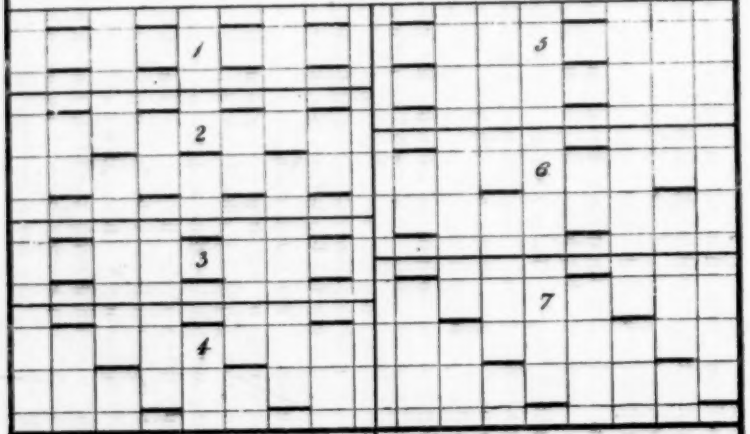
Now, children, what are we going to do to-day? All draw on your slates a line like you did the last time you had drawing. Yes, that is right. What name did we give to this line? 'A straight upright line.' Yes, and I heard Mary say 'a vertical line;' now that is the name I want you all to give to lines like this. Now, I see on Harry's slate a line like this (Teacher drawing on blackboard a line one square long), and on Mary's one like this (marking on blackboard a line two squares long), and on James's I see one like this (three squares long). Now, who can tell me which is right? Yes, Tommy says they are all right. You all remember, I dare say, that we drew vertical lines of all these different lengths. You may all draw a vertical line one square long; now one, two squares long; and now one, three squares long; that is very good. Tell me again what kind of lines they are. Well, you may all say 'They are vertical lines,' and I want you to remember that whenever we have lines like these, no matter how long, we call them vertical lines.

Now, look at the red lines ruled on the blackboard. Which are the vertical lines? 'Those that run from the top to the bottom of it.' Look again and you will see some other lines. Which way do they run? From side to side: these are the lines which I want you to look at very carefully to-day. Show me those lines on your slates. Hold your pencils to make the same kind of line. Where do you see any in the room like them? Look at your slates and point to a little one. Now notice where I put my chalk on the blackboard; you see it is on the first top corner of the first square. Yes, and that is where I put it when we began drawing the vertical line. Watch me very closely and tell me what I have done when I stop. You have drawn along the top line. What did we do before? Drew down the line at the side. Well, now I want you to take your pencils and draw a line like the one on the blackboard. Now look while I make another. Where do I begin? On the next square but one. Yes, you see we leave a little space, then begin and draw along to the next corner. Now you make one like that—be very careful to begin at the corner; then keep quite on the line and stop at the next corner. (The Teacher should examine the slates, correcting any mistakes by showing the same on the blackboard and getting the children to alter them on their slates. Of course, sometimes it will be necessary to give personal assistance.) Do you remember we found names for our vertical lines? Do you think you could find a name for these lines? Yes, that will do. John says they look like posts that are waiting to be put up, and Robert says they look like pieces of pencil lying on the desks. We said that the vertical lines looked like little boys who stand nicely. Do these lines remind you of little boys? No. Well, I see that Mary wants to tell me something. What is it Mary? 'Those lines are like little boys when they are lying down.' Yes, they are like good little boys who want to grow strong and straight. Do you know how these little boys always lie? Yes, quite straight.

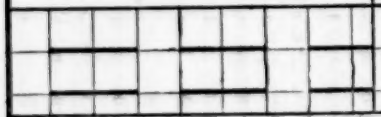
Can you see anything in the room like these lines? 'The top of the door.' 'The top of the picture, also the bottom of the picture.' Well, what would you say about the bottom of the door?—the top and bottom of our slates?—also the blackboard?—the edge of the desk? Which edge? Yes, that is right.

The top line on the slates having been carefully filled the children might be allowed to do the next line, working with the teacher and having their attention carefully drawn to the fact that the lines in the second row are under the lines in the first row. After the errors have been thoroughly corrected the children might be allowed to go on drawing the lines, the teacher all the time carefully superintending and remembering not to let the children draw too many lines without talking to them about their work.

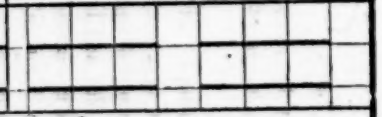
V. Horizontal lines 1 square long.



VI. 2 squares long.

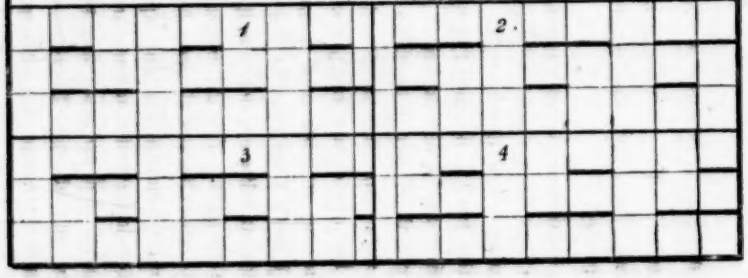


VII. 3 squares long.

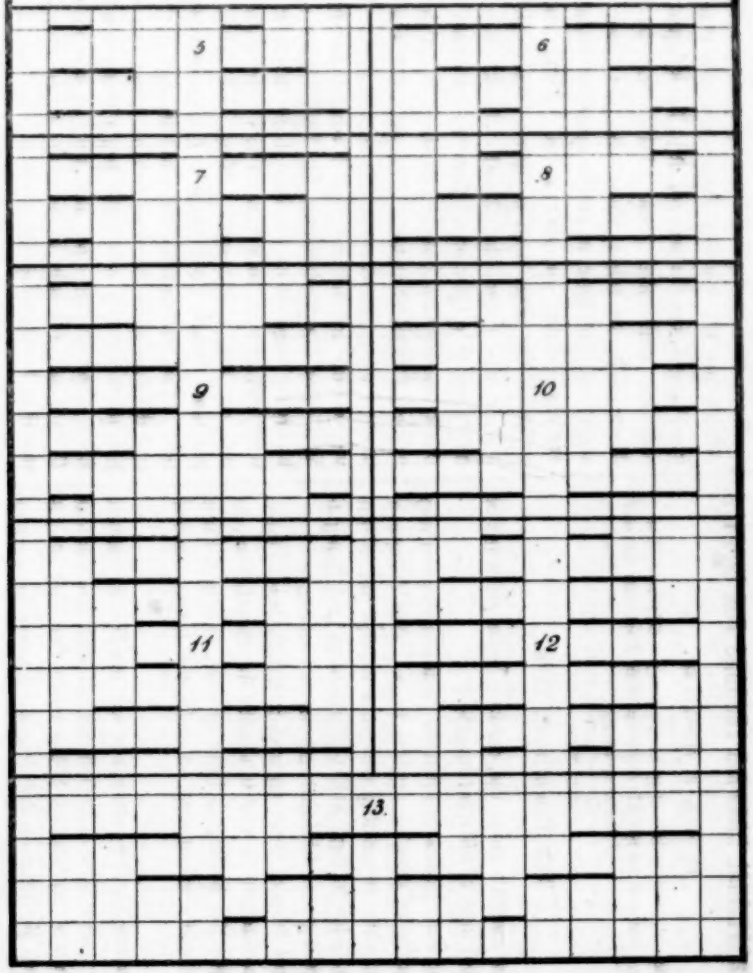


Exercises simular to V should follow.

VIII. Combination of horizontal lines.



VIII continued.



QUEEN'S SCHOLARSHIP EXAMINATION, 1891.

MODEL ANSWERS TO MEN'S QUESTIONS.

Dictation and Penmanship.

Twenty minutes allowed for these Exercises. Candidates are not to PAINT *their letters in the* COPY-SETTING EXERCISE, *but to take care that the copy is clean and without erasures.*

Omissions and erasures in the DICTATION EXERCISE *will be counted as mistakes.*

The words must not be divided between two lines; there is plenty of room for the passage to be written.

Write in largehand, as a specimen of Penmanship, the word—
Cosmopolitan.

Write in smallhand, as a specimen of Penmanship—
The world knows nothing of its greatest men.

Dictation.

Write the passage (given below) dictated to you by the Examiner.

It is evident | that whatever inspires feelings of terror, | or of great wonder, | and whatever excites in the mind | an idea | of the vague and uncontrollable, | has a special tendency | to inflame the imagination, | and bring under its dominion | the slower and more deliberate operations | of the understanding. | In such cases | man, contrasting himself | with the force and majesty of nature, | becomes painfully conscious | of his own insignificance. | A sense of inferiority | steals over him. | From every quarter | innumerable obstacles hem him in, | and limit his individual will. | His mind, appalled by the indefined | and indefinable | hardly cares to scrutinize the details | of which | such imposing grandeur consists. | On the other hand, | where the works of nature | are small and feeble, | man gains confidence; | he seems more able | to rely on his own power; | he can, as it were, | pass through | and exercise | authority in every direction. ‖

Grammar and Composition.

Two hours and a half are allowed for this Paper. No abbreviation of less than three letters is to be used in Parsing and Analysis. All candidates MUST *answer questions 1 and 2, and may select* FOUR (*not more*) *of the remaining eight questions.*

1. Write a short essay on *one* of these subjects:—
The snowstorm in March, 1891, *or*
Fruit Trees, *or*
The Census.

THE CENSUS.

The term *census* is derived from the Latin word *census*, a registering and rating of the citizens or people in general.

In ancient times this enumeration and classification was almost solely for religious, fiscal or military purposes, and a census was taken at short intervals both at Rome and Athens.

Two census-takings stand out in prominent mention in the Scriptures, the former due to the impious pride of David and the latter decreed by Cæsar Augustus.

In modern times the census is much more than a bare numbering; it comprises a variety of returns as to age, sex, sanity, birthplace, occupation, and kind of residence, &c.

The first formal census of Great Britain was taken in 1801, and since then has recurred every decade, one having been carried-out during the present year.

As regards its objects, the census has abandoned any religious aims and is devoted to collecting such returns as are judged requisite in order to promote national, local, political, social and sanitary reform, advancement or adjustment.

Each district is theoretically supposed to be represented in Parliament, and to receive imperial grants in proportion to its population, and therefore it is highly necessary to be accurately informed on this point.

2. Analyse fully the following lines, and parse the words printed in italics:—

'*Tis* morn, but scarce *yon* level sun
Can pierce the war clouds' *rolling dun*,
Where furious Frank and fiery Hun
Shout in their sulphurous canopy.

Few, few *shall part* where many meet;
The snow shall be *their winding sheet*,
And every turf beneath their feet
Shall be a soldier's sepulchre.

Sentence.	Kind of Sentence.	Subject. Simple.	Subject. Extension.	Predicate. Simple.	Predicate. Extension.	Object. Simple.	Object. Extension.
(*a*) 'Tis morn	Principal	it		is morn			
(*b*) but scarce yon level sun .....canopy	Principal adversative to *a*	sun (but)	yon level	can	scarce	[to] pierce ...canopy	
(*b* 2) Where furious Frank and fiery Hun.....canopy	Adjective, qual. *dun*	Frank (where) Hun	furious fiery	shout	where in their.....canopy		
(*c*) Few, few.....meet	Principal	few, few		shall part	where many meet		
(*c* 2) where many meet	Adverb, mod. *part*	many (where)		meet	where		
(*d*) The snow shall.....sheet	Principal	snow	the	shall be... sheet			
(*e*) And every turf.....a soldier's sepulchre	Principal, co-ord. with *d*	turf (and)	every beneath their feet	shall be a soldier's sepulchre			

it—pers. pro., sing., 3rd, neut., nom., subject to *is*.

is—verb, subst., indic., pres., sing., 3rd, agrees with its subjects *it* and *morn*.

yon—dem. adj. (quasi 3rd pers.), pointing out *sun*.

can—verb, irreg. (strong), defect., prolative, trans., act., indic., pres., sing., 3rd, agrees with its subject *sun* and gov. *to pierce*.

[to] *pierce*—verb, reg. (weak), trans., act., infin., governed by *can* and governing *dun*.

N.B.—Some grammarians consider *can pierce* as potential mood.

rolling—pres. part. of reg. verb *to roll*, used attributively, qualifying *dun*.

dun—adj., used as a noun, sing., 3rd, neut., obj., gov. by *pierce*.

N.B.—This passage is often written with *clouds* in the obj. case gov. by *pierce*, and then *rolling* would qualify *clouds* and *dun* would be a factitive adj. qual. *clouds*.

shall—verb, aux., irreg. (strong), trans., act., indic., fut., plur., 3rd, agrees with its subject *few* and governs *part*, making with the latter the future tense of *to part*.

[to] *part*—verb, reg. (weak), intrans., infin., gov. by *shall*.

shall part—verb, reg. (weak), intrans., indic., future, plur., 3rd, agrees with its subj. *few*.
their—pers. pro., plur., 3rd, com., poss., qual. *sheet*.
winding—pres. part. of irreg. verb *to wind*, used attributively, qual. *sheet*.
sheet—com. noun, sing., 3rd, neut., nom., subj. after the verb *shall be*.
N.B.—*Winding-sheet* is better taken as one noun.
shall—verb, aux., irreg. (strong), trans., act., indic., future, sing., 3rd, nom., agrees with its subjects *turf* and *sepulchre*.
[to] *be*—verb, subst., infin., gov. by *shall*, and forming with *shall* the future tense of *to be*.
shall be—verb, subst., indic., future, sing., 3rd, agrees with its subjects *turf* and *sepulchre*.

3. Paraphrase the following passage :—

In misery's darkest cavern known
His useful care was ever nigh,
Where hopeless anguish poured his groan,
And lonely want retired to die.

His virtues walked their narrow round,
Nor made a pause, nor left a void ;
And sure the Eternal Master found
The single talent well employed.

Whenever any were sunk in deepest gloom, were excruciated by continual pain, or dying in seclusion from unregarded poverty, he was anxiously ready to succour and comfort.

He was not a man of versatile endowments, but he so perseveringly and without cessation utilised his limited opportunities as undoubtedly to secure the Divine blessing.

4. State the requirements of the Code under the head of '*English*' in Standard III., and show how the lessons may be utilised so as to teach the children to frame sentences and speak correctly.

'Pointing out nouns, verbs, adjectives, adverbs, and personal pronouns, and forming simple sentences containing them.'

Only limited opportunities are afforded by the English required from Standard III. of furthering correctness of speech, although more may be achieved in framing sentences. For it must not be forgotten that incorrect speech chiefly arises from violation of Syntax or idiom, and Standard III. work touches neither of these points.

Nevertheless, the scholars may be taught to use words with an accurate idea of their relative meanings, and to distinguish between the same word used as (*a*) noun or verb, (*b*) noun or adjective, (*c*) adjective or adverb, etc.

Examples.

(*a*) Boys and girls like *work* (noun).
Men *work* hard (verb).
(*b*) The door is made of *iron* (noun).
I made the *iron* door (adject.).
(*c*) Men like *hard* work (adject.).
Men like to work *hard* (adverb).

Harder exercises are such as involve participles or duplex meanings, as—

(*d*) The *whistling* bullet smote the sand (partic.).
(*e*) I am going to *work* (noun or verb?)

Finally, correct speech comes from correct habit and thought, and something may be done by comparing incorrect with correct forms, and analysing the grammatical structure and meaning of very simple and suitable sentences.

5. From each of the words '*joy*,' '*glory*,' '*true*,' '*wise*,' form three other words by the addition of a suffix, introducing each word into a short sentence.

Word.	Suffix.	Compound.	Sentences.
Joy	-ful	joyful	With *joyful* hearts we bless His name.
	-ous	joyous	O what *joyous* sports are ours!
	-less	joyless	The *joyless* slave in fetters gropes.
Glory	-fy	glorify	I will not *glorify* crime.
	-ing	glorying	All thy vain-*glorying* will avail thee not.
	-ed	gloried	His face was *gloried* as the harvest moon.
True	-th	truth	Simple *truth* was written in his face.
	-ly	truly	It is *truly* as thou sayest.
	-ism	truism	His boasted principles are all *truisms*.
Wise	-dom	wisdom	*Wisdom* is justified of all her children.
	-ard	wizard	Merlin was a *wizard* old.
	-ly	wisely	He loved not *wisely* but well.

6. Explain as to Standard VI. the meaning of a 'Noun Sentence,' and write four short passages containing one.

A noun sentence is one that fulfils the office of a complex noun. It may be used either as the subject or the object of a sentence, and is itself therefore evidently a subordinate and not a principal sentence.

Examples.

I. *As Subject:* 'That *you have wronged me* doth appear in this.'
'It appears that *you are right*.'
II. *As Object:* 'I told him *you did love him well*.'
'They assumed *he would be present*.'

7. What do you mean by the '*Comparison of Adjectives*'? When ought the comparative and when the superlative form to be used? What classes of adjectives do not admit of comparison?

The comparison of adjectives, as far as accidence is concerned, is an inflective device to avoid the use of such adverbs as *more* and *most*.

The positive degree is the simple form of the adjective, as *poor*, *extraordinary*, *bad*, and does not, strictly speaking, imply comparison at all.

The comparative degree expresses a higher amount of the quality than the positive, as *poorer*, *more extraordinary*, *worse*.

The superlative degree expresses the highest amount of the quality, as *poorest*, *most extraordinary*, *worst*.

The following classes of adjectives cannot be compared :—

(*a*) Nouns used as adjectives, as 'The *iron* ship.'
(*b*) Adjectives denoting substance, as 'The *brazen* laver.'
(*c*) The Articles *an* and *the*.
(*d*) The Demonstratives *this* and *that*.
(*e*) *Proper* Adjectives, as 'The *French* nation,' 'The *Ottoman* Empire.'
(*f*) Some Locative Adjectives, as 'The *underground* railway,' 'The *trans-alpine* countries.'
(*g*) Adjectives of a definite degree of meaning, as 'The *square* tower, 'The *same* man,' 'The *bottom* step.'
(*h*) Many Participles, as 'The *destined* punishment,' 'The *crying* baby.'

8. In what manner does a Relative Pronoun resemble a Conjunction? How would you distinguish one from the other?

A Conjunction simply connects, but a Relative Pronoun both connects and represents.

Examples.

(1) 'John *and* James will stay *or* depart.'
Here *and* and *or* are Conjunctions and simply connect.
(2) 'Felix, *who* had been recalled to Rome, left Paul bound.'
Here *who* not only connects the two sentences, but also represents the Noun Felix.

Even where Relative Pronouns are contained in purely Adjectival sentences they have some conjoining force.

Relative Pronouns may be distinguished from Conjunctions because of—

(1) Their dual office.
(2) Never being contained in simple sentences, and
(3) Their limited number, which admits of their arbitrary recognition.

The word *but* presents the only difficulty, and for this see Answer to Question 9.

9. Explain the meaning and the grammar of the word *but* in each of the following sentences :—

(*a*) There is no man here *but* honours you.
(*b*) *But* yesterday the word of Cæsar might have stood against the world.
(*c*) He came *but* did not remain long.
(*d*) Life has passed with me *but* roughly since I saw thee last.
(*e*) No tongue *but* Hubert's.

Examples.	Meaning.	Grammar.
(*a*)	who [does] not.	A kind of negative Relative. Subject to *honours*.
(*b*)	as recently as.	Adverb modifies the Adv. Objective *yesterday*.
(*c*)	on the other hand.	Adversative Conjunction, joining two sentences.
(*d*)	only.	Adverb modifies the Adv. *roughly*
(*e*)	except.	Prep. gov. [*tongue*].

10. Say what you know of any *two* of these writers:—Bacon, Johnson, Pope, Macaulay,—and what books they wrote.

Bacon. Francis Lord Bacon was introduced to public notice by the Earl of Essex, and subsequently evinced great ingratitude by assisting in the prosecution of that nobleman. In the reign of James I. he successively filled the chief legal offices and was appointed Lord Chancellor in 1618, only to be dismissed from his post in 1621 for receiving bribes.

His reputation as a philosopher far exceeds that as a lawyer or politician, and in scientific investigation he inaugurated a new era of synthetic experimental investigation.

His chief works are 'Novum Organum' and the 'Advancement of Learning.'

Johnson.—Dr. Samuel Johnson was one of the most distinguished writers and the greatest conversationalist of the eighteenth century. He was born in 1709, and lived to the age of seventy-five.

He was educated at Lichfield, Stourbridge, and Oxford, but had to leave the university after three years' residence without a degree, although he attained considerable reputation there as an accomplished Latinist. Having attempted to get his living as an usher, a schoolmaster, and a contributor to Cave's 'Gentleman's Magazine,' he set out for London in 1737 with his celebrated pupil David Garrick, having previously married Mrs. Porter and her £800.

In the metropolis he made his way step by step by sheer force of genius, industry, and integrity, and after a quarter of a century's grinding poverty was awarded a pension of £300 a year by the Bute administration.

In 1775 his *alma mater* awarded him the D.C.L. degree, and he attained the position of dictator in the literary world.

His chief friends were Mrs. Thrale, Sir Joshua Reynolds, Burke, Goldsmith, and Garrick, his *great* biographer Boswell; and his principal works, 'The Vanity of Human Wishes,' 'The Rambler,' 'The Dictionary,' 'Rasselas,' and 'Lives of the Poets.'

As a man Dr. Johnson was in mind, as well as in person, powerful but rugged, yet capable of acts of benevolence and of substantial generosity which do honour to human nature.

Pope.—The poet Alexander Pope lived from 1688 to 1744 throughout a comparatively uneventful life. Health he never knew; weakness, languor, and pain continuously oppressed him, and he could not even sit upright without bandages. His disposition and temper were in exact conformity with his bodily frailties, and his general bearing was marked by conceit, selfishness, scorn, envy, hatred, malice, and all uncharitableness.

From his youth up he 'lisped in numbers,' and was the first to confer upon English poetry that smoothness of versification which it still retains.

In religion he was a Romanist, and his fidelity to his belief does honour to his morality.

Among his works may be mentioned 'Translation of the Iliad and Odyssey,' 'The Messiah,' 'Essay on Criticism,' 'The Dunciad,' and 'The Essay on Man.'

Macaulay.—Thomas Babington Macaulay, statesman, essayist, historian, and poet was born at Rothley Temple, Leicestershire, in 1800, and died at Kensington in his sixtieth year.

Educated at Trinity College, Cambridge, he showed great ability as a poet, debater, and *litterateur*. In 1830 he entered Parliament, but from 1834 to 1838 resided in India as a member of the supreme council. During various periods he held office under Whig administrations as Secretary for War and Paymaster of the Forces, and represented the borough of Edinburgh.

His chief literary efforts were 'The Lays of Ancient Rome,' 'Essays in the Edinburgh Review,' and a magnificent history of England from the accession of James II. to the death of William III. He was buried beside Sheridan in the Poet's Corner of Westminster Abbey.

French.

FEMALE CANDIDATES.

(Two hours allowed for this Paper.)

1. Translate into English:—

(*a*) Ses conducteurs furent touchés de sa situation; ils se cotisèrent pour lui acheter une pelisse de mouton, qui dans le pays ne *coûte* que cinq roubles; malheureusement il ne s'en trouva point à vendre; aucun des habitants de cette ville *isolée* ne voulut faire le sacrifice de la sienne, parce-qu'il était difficile de la remplacer. Dans cette perplexité, un des plus jeunes conducteurs proposa tout à coup un expédient des plus singuliers, et qui permit à Prascovie de profiter de leur bonne volonté. 'Nous lui *prêterons*,' dit-il, 'tour à tour nos pelisses, ou bien elle prendra la mienne une fois pour toutes, et nous changerons entre *nous* à chaque verste.'

(*b*) Lorsqu'elle rentra, vers les neuf heures du soir, elle fut aussitôt, et pour la première fois, appelée au salon; le succès qu'elle *venait* d'obtenir avait opéré une petite révolution dans l'esprit de tout le monde. Son bonheur fit le plus grand plaisir, et *parut* en faire davantage encore aux personnes qui ne lui avaient témoigné jusqu'alors que de l'indifférence. On observa qu'elle avait une jolie tournure et de beaux yeux. *Plusieurs* des membres de la société s'offrirent généreusement de parler au ministre en sa faveur et de la protéger; enfin, le contentement parut général, et le joueur de boston, après que les remises furent *achevées*, donna *lui-même* des marques sensibles d'intérêt.

2. Parse the words printed in italics. In parsing verbs give their participles.

(*a*) Her guides were touched by her situation; they clubbed together to buy her a sheepskin, which in the country only costs five roubles; unhappily, there was not one to sell; none of the inhabitants of this isolated town wished to make a sacrifice of theirs, as it was difficult to replace it. In this perplexity, one of the youngest guides suddenly proposed a most singular plan, and which permitted Prascovie to profit by their good nature. 'We will lend to her,' said he, 'our "*pelisses*" in turn, or else she shall take mine at once for good, and we will change among us at every verst.'

(*b*) When she entered again, towards nine in the evening, she was immediately, and for the first time, called to the drawing-room: the success she had just obtained had worked a little revolution in the mind of every one. Her good fortune gave the greatest pleasure, and appeared to give greater still to people who had before only showed indifference. It was observed that she was well made, and had beautiful eyes. Many members of the company generously offered to speak to the minister on her behalf, and to protect or patronise her; indeed, the satisfaction appeared general, and the very Boston player, after the deals were finished, gave several perceptible marks of interest.

2. PARSING.

Coûte—Coûter, coûtant, coûté, 1st conj., reg., intrans., ind., pres., 3rd sing., agreeing with *qui*.

Isolée—Isoler, isolant, isolé, past part., fem., qual. and agreeing with *ville*, 1st conj.

Prêterons—Prêter, prêtant, prêté, 1st conj., reg., trans., act., ind., future, 1st plur., agreeing with *nous*.

Nous—Pers. pro., 1st plur., masc., obj., gov. by *entre*.

Venait—Venir, venant, venu, 2nd conj., irreg., intrans., ind., imp., 3rd sing., agreeing with *elle*.

Parut—Paraître, paraissant, paru, 4th conj., irreg., intrans., ind., pret., 3rd sing., agreeing with *bonheur*.

Plusieurs—Pers. pron. (adj. used as), 3rd plur., com., nom. to *s'offrirent*.

Achevées—Achever, achevant, achevé, past part., fem., qual. and agreeing with *remises*, 1st conjugation.

Lui-même—Pers. pron., 3rd sing, masc., nom. in apposition with *joueur*.

3. Give the feminine of chat, tigre, neveu; the plural of bijou, cheval, corail; the imperfect indicative of aimer, acquérir, voir.

MASCULINE.	FEMININE.	SINGULAR.	PLURAL.
Chat	Chatte	Bijou	Bijoux
Tigre	Tigresse	Cheval	Chevaux
Neveu	Nièce	Corail	Coraux

IMPERFECT INDICATIVE.

J'aimais	Nous aimions
Tu aimais	Vous aimiez
Il aimait	Ils aimaient
J'acquérais	Nous acquérions
Tu acquérais	Vous acquériez
Il acquérait	Ils acquéraient
Je voyais	Nous voyions
Tu voyais	Vous voyiez
Il voyait	Ils voyaient

4. Write in French:—

Eighteen hundred and ninety-one. You are right, I am sure. My sister has lived in Germany several years. I should much like to go there to see her. My cousin is not at school to-day, but he hopes to return on Monday.

ENGLISH.	FRENCH.
1891	Milhuit cent quatre vingt onze
You are right, I am sure	Vous avez raison, j'en suis sûr
My sister has lived in Germany several years	Ma sœur a demeuré en Allemagne depuis plusieurs années
I should much like to go there	J'aimerais beaucoup y aller
My cousin is not at school to-day, but he hopes to return on Monday	Mon cousin n'est pas à l'école aujourd'hui, mais il espére y être de retour lundi

Geography and History.

Three hours are allowed for this paper. All candidates MUST *draw a map (Question 1), and may answer* FIVE *questions in each subject, but not more. The map is counted as a question.*

Geography.

1. (*a*) Draw the outline of the coast from Fife Ness to North Foreland, the courses of the Thames, of the Yorkshire Ouse, and of the Trent, and of their chief tributaries. Give (approximately) the latitude of York and the longitude of Liverpool; *or*

(*b*) Draw meridians and parallels as for a map of the Mediterranean. Mark the positions of Gibraltar, Rome, the Isthmus of Corinth, the Dardanelles, and Port Said. Draw the coast-line between any two of these places; *or*

(*c*) Draw meridians and parallels as for a map of Australia. Sketch the coast-line from Brisbane to the mouth of the Murray. Mark the position of Sydney, Melbourne, Adelaide, Perth. Indicate the points where the boundaries between Queensland and New South Wales, between New South Wales and Victoria, between Victoria and South Australia, meet the coast.

It is manifest that a full answer inserted here would be too spacious and unprofitable. Any good atlas will furnish complete information.

2. (*a*) Why does the Ganges rise from May to September? (*b*) Why does the Rhone enter the Lake of Geneva as a swift and turbid stream and leave it clear and transparent? (*c*) How are deltas formed? (*d*) How is it that deltas are common at the mouths of rivers falling into the Mediterranean, and that large rivers in South America form no deltas?

N.B.—This question is taken almost verbatim from Gregory's Physiography, published by Hughes.

(*a*) The Ganges rises from May to September owing to the melting of snow on the Himalayas, and the occurrence of the wet monsoon.

(*b*) The Rhone rises in a glacier 5,600 feet above the level of the sea and dashes down a steep declivity with great rapidity, carrying with it soil eroded from its basin. Entering the still waters of Geneva its course is checked, and the soil transported from the Alpine slopes is deposited, the weightier portions first, and the lighter further on the lake.

(*c*) In precisely the same way sediment is deposited when a river surcharged with matter enters the still waters of a quiet sea.

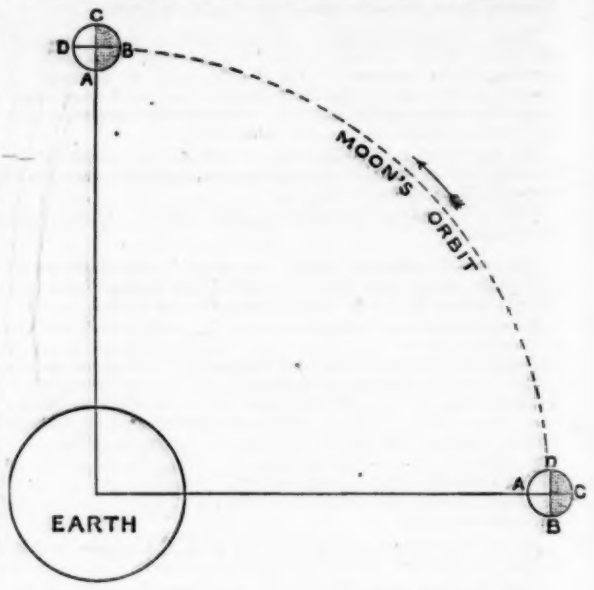
(*d*) The Mediterranean, being almost tideless, particularly favours the formation of deltas, but the large rivers of South America flow into the open oceans, where tidal waves and currents (of even greater transporting power than the rivers) exist. The river sediment is, therefore, borne out to sea and is finally dispersed over a large area of ocean floor.

3. (*a*) Draw a diagram of the planetary system. (*b*) Why does the moon present nearly the same face to the earth throughout the year? (*c*) Give approximately the moon's distance from the earth.

(*a*) See any respectable atlas or astronomical geography.

(*b*) The moon revolves on its axis in the same time as around its primary, the earth. Suppose the moon to present the hemisphere BAD to the earth. Let it move through 90°. Then, if it did rotate, the hemisphere ABC would be visible from the earth; but this is not the case, as the moon has also revolved upon its axis 90°, thus counteracting the effect of the motion of transference, and preserving the hemisphere BAD in view.

(*c*) The moon's average distance from the earth is 240,000 miles.



4.

Athens.	New York.
Bombay.	Paris.
Buenos Ayres.	Rangoon.
Cardiff.	Rome.
Liverpool.	Venice.

(*a*) Give as nearly as you can the position of the above places, and (*b*) show how the political or commercial supremacy of any of them has depended on geographical position. (*c*) Mention any great engineering works by which communication between any of the towns named and other places has been improved.

(*a*) Athens, *Lat.* 37° 58′ N.; *Long.* 23° 43′ E., on the Gulf of Egina.

Bombay, *Lat.* 18° 57′ N.; *Long.* 72° 51′ E., on an island near the middle of the west coast of India.

Buenos Ayres, *Lat.* 34° 39′ S.; *Long.* 58° 23′ W., on the southern shore of the estuary of the La Plata.

Cardiff, *Lat.* 51° 23′ N.; *Long.* 3° 9′ W., at the mouth of the Taff.

Liverpool, *Lat.* 53° 24′ N.; *Long.* 2° 59′ W., on the northern bank of the estuary of the Mersey.

New York, *Lat.* 41° 6′ N.; *Long.* 74° 0′ W. on the island of Manhattan, at the mouth of the Hudson.

Paris, *Lat.* 48° 50′ N.; *Long.* 2° 20′ W., on the Seine, 111 miles from its mouth.

Rangoon, *Lat.* 16° 53′ N.; *Long.* 96° 4′ E., in Pegu, on the eastern branch of the Irawady.

Rome, *Lat.* 41° 54′ N.; *Long.* 12° 59′ E., 16 miles from the mouth of the Tiber.

Venice, *Lat.* 45° 26′ N.; *Long.* 12° 20′ E, built upon about 80 islands in the N.W. of the Adriatic, and close to the Italian mainland.

(*b*) *Athens* was almost the centre of the Grecian colonies (excluding Marseilles), which extended from Magna Græcia to Asia Minor, and for a long time monopolised the trade of the Levant.

Liverpool, possessing a well sheltered and inwardly widening estuary on the coast of England nearest America, has engrossed the importation of cotton.

Rome, built upon hills, seated upon the Tiber banks, and centrally placed as regards the Mediterranean, was in the path of the wave of power which flowed westward from Assyria, Persia, and Greece.

Venice was the sea terminus of the commerce between India, Asia Minor, and the West of Europe.

(*c*) Cardiff and Liverpool are renowned for their docks, and the latter also for the Mersey tunnel. New York, Paris, Rome, and Venice are famed for numerous bridges. Numerous canals and railways run from and to many of the above places.

5. Write notes of a lesson on 'THE INHABITANTS OF INDIA.' State the Standard for which you design the lesson, and the chief facts which you think it important to impress on the minds of the children.

COMPARATIVELY BRIEF NOTES FOR A LESSON TO STANDARD VI.

FACTS TO REMEMBER.	DETAIL AND METHOD.
I. *Their immense number.*	260 millions, nine times as many as in England, and three times as many as in Russia.
II. *Their diversity as regards—*	
(*a*) Race.	(*a*) Tartars, Tamils, Hindoos, Mahrattas, Sikhs, &c. Their different characters.
(*b*) Language.	(*b*) About thirty different languages. Sanscrit, the elder brother of Latin and Greek.
(*c*) Religion.	(*c*) As numerous as the races, Brahmism, Buddhism, Mahomedanism, and Parseeism. The system of castes. Several rough outline coloured maps to show the above points.
III. *Reason of above Diversity.*	India has been repeatedly subdued by invaders from the North-West. Our 'Scientific Frontier.'
IV. *Difficulty of Governing.*	On account of above diversities in language, character, customs and laws. Illustrate by the 'Irish difficulty,' and by Austria. Impress the responsibility of Englishmen for the well-being of India.

Write down heads of left-hand column on the blackboard, and use large wall and manuscript maps, together with pictures of the Hindoo races.

6. Give a short account of the climate and population of—(*a*) Cape Colony, *or* (*b*) Russia in Europe, *or* (*c*) Canada.

(*a*) CAPE COLONY.—The climate is peculiarly healthy, and is most agreeable in the winter and spring. The eastern and western coasts differ considerably. The summer heat is oppressive and the dry season is occasionally of inordinate length. The general temperature is higher than that of England, but the variations are not so great. The population, about 800,000, or including British Kaffraria, Transkei and Griqualand West, nearly 1,200,000, comprises Europeans (Dutch, English, Germans, &c.), Hottentots, Malays, Fingoes, Kaffirs, and Bechuanas.

(*b*) RUSSIA IN EUROPE has, owing to its great extent, many varieties of climate. It is very cold in the north and is throughout more severe than the same latitudes in the rest of Europe. The Baltic, the Caspian Sea, and the Sea of Azov are often frozen.

The Russians number about 93,000,000, and are mostly Sclavs; but in the north-west the Finns, in the south-east the Tartars, and in mid-west the Germans are most numerous.

The Poles are a mixture of Germans, Celts, and Sclavs. Jews are numerous, and persecuted in Russia.

(*c*) CANADA.—The following is an abbreviation of the *official* account of the climate:—

> 'Snow covers the ground in winter to the depth of two or three feet, but it is perfectly dry and packs under foot, making the best roads, and warmly covering the earth. The dry winter atmosphere is both bracing and pleasant; the sun shines brightly by day and the moon by night during most of the season. There is no healthier climate under the sun. The summers are in the main warm and bright, and fruits and vegetables which will not mature in England ripen here to perfection.'

The population of Canada comprises French in Quebec, Scotch in Nova Scotia, and English, Irish, and Germans everywhere. Indians are found throughout, about one-third being in British Columbia, and Esquimaux range the northern and western shores.

The people of European descent number about 14,900,000; of American, about 100,000.

7. (*a*) What rivers flow into the Gulf of Mexico? (*b*) Describe the course of one of them. Explain how the United States are governed.

(*a*) On the North the Alabama and Mississippi, and on the West the Rio Grande Del Norte and the San Juan.

(*b*) The Mississippi, which with its tributary, the Missouri, is the second largest river in the world, rises in the small Lake Itasca, in Minnesota, and its whole course, considered generally, is in a southerly direction. It flows through Minnesota, then between Iowa, Missouri, Arkansas on the right bank, and Wisconsin, Illinois, Kentucky, Tennessee, Mississippi on the left bank, and at last traversing Louisiana discharges itself by many channels, which form a swampy delta, into the Gulf of Mexico.

The length of the Mississippi proper is about 2,500 miles.

Its chief tributary, the Missouri, rises in the Rocky Mountains and the State of Montana, flows north and east, and then turns south-east through Dakota. Thence journeying between Nebraska and Kansas on the right, and Iowa and Missouri on the left, it pierces through the State of Missouri and combines with the Mississippi near St. Louis.

The Mississippi receives on its right bank the Missouri, Kansas and Red River, and on the left bank the Illinois and the Ohio.

Its principal towns are St. Louis and New Orleans on the main stream, Jefferson on the Missouri, Pittsburg and Cincinnati on the Ohio, and Florence on the Tennessee.

(*c*) The Government of the United States consists of—(A) The President, (B) The House of Senators, and (C) The House of Representatives.

(A) The PRESIDENT is selected for four years, and is the chief executive officer. Together with the Senate, he has the power of conducting all foreign affairs, of making treaties and declaring wars. Over any measure passed by the CONGRESS by a less majority than two-thirds he has the power of veto.

(B) THE HOUSE OF SENATORS is chosen by the States' legislatures. Each State elects two, and every two years one third of the House retires. Thus every member holds office for six years.

(C) THE HOUSE OF REPRESENTATIVES is elected directly by the population, each State being represented in proportion to the number of its inhabitants. The members continue in office for two years.

The Houses of Senators and Representatives together form THE CONGRESS, in which the legislative power is vested. Each State manages its internal affairs without national interference.

History.

8. What were the chief events in Britain during the administration of (*a*) Suetonius Paulinus, and (*b*) Julius Agricola?

(*a*) Suetonius governed Britain from A.D. 58 to A.D. 62. He captured Anglesea, slaughtered the Druids, and levelled its consecrated altars and groves. But while absent in the west, trouble arose in the south-east, owing to the brutal and licentious conduct of the Imperial procurator towards Boadicea, Queen of the Iceni, and her two daughters. Her subjects flew to arms, and assisted by the Trinobantes destroyed Camalodunum (Colchester), Londinum (London), and Verulamium (St. Albans), massacring 70,000 inhabitants. But Suetonius hastening back defeated the Britons so decisively that 80,000 were slain, and Boadicea poisoned herself.

(*b*) Julius Agricola from A.D. 78 to A.D. 84 restored the honour of the Roman arms, which had lost some of their lustre on account of their slow progress in subjugating Britain. He annihilated the Ordovices, recaptured Anglesea, reduced the island as far northwards as the Tay, and built a wall from the Firth of Forth to the Firth of Clyde.

Having equipped a powerful fleet, he forced the Grampian passes in A.D. 74, defeating Galgacus, and made himself master for a time of all Britain; whilst his navy, starting from Sandwich, conquered the Orkneys and circumnavigated the island.

9. Mention times in English History when the countries of the Spanish Peninsula have been (*a*) connected with England by royal marriages, and by alliance in war; (*b*) in commercial rivalry, or at open war with England.

(*a*) 1367.—The Black Prince aided Don Pedro of Castile.
1501.—Prince Arthur, son of Henry VII., married Catherine of Arragon.
1509.—Henry VIII. married Catherine of Arragon.
1544.—Henry VIII. allied himself with Charles V. of Spain against France.
1554.—Mary married Philip of Spain.
1557.—Alliance with Spain against France.
1660-1685.—Charles II. married Catherine of Braganza.
1808-1814.—Peninsular War against Napoleon.

(*b*) 1584-1602.—War with Spain. 1588.—Spanish Armada.
1617.—Raleigh's Expedition to Guiana.
1624.—War against Spain on behalf of German Protestants.
1655-57.—War against Spain, and capture of Jamaica and the Spanish treasure ships.
1702-1713.—War of the Spanish Succession.
1718-1729.—Quadruple Alliance against Spain. Victory of Cape Passaro.
1720.—Formation of South Sea Company.
1739-1748.—War with Spain. Capture of Porto Bello.
1762-63.—War against Spain. Capture of Martinique, Grenada, Havanna, Manilla, &c.
1779-83.—War against Spain during conflict of American Independence.
1796-1802.—War against Spain and France, &c.
1803-1808.—War against Spain. Battle of Trafalgar, 1815.
1885—.—Commercial rivalry in Africa with Portuguese.

From the time of Elizabeth to the decay of Spanish power in South America, England and Spain were incessant rivals, and either at suppressed or open variance.

10. Trace by genealogical tables (*a*) the double descent of Henry IV. from Henry III., and (*b*) the descent of Queen Victoria from James I.

(*a*)

HENRY III. (1216)

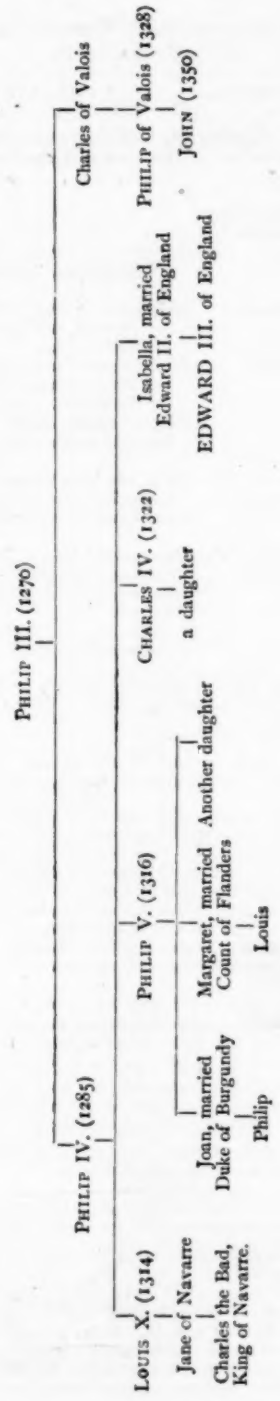
EDWARD I. (1272)	Edmund Crookback, Earl of Lancaster
EDWARD II. (1307)	Henry, Earl of Lancaster
EDWARD III. (1327)	Henry, Duke of Lancaster
John of Gaunt, Duke of Lancaster	Blanche, married John of Gaunt

HENRY IV. (1399)

(*b*)

JAMES I. (1603)
Elizabeth, married Frederic, Elector Palatine
Sophia, married Ernest Augustus, Elector of Hanover
GEORGE I. (1714)
GEORGE II. (1727)
Frederic, Prince of Wales
GEORGE III. (1760)
Edward, Duke of Kent
VICTORIA (1837)

11. What was the claim of Edward III. to the crown of France? Give the chief events of the war caused by that claim, from 1340 to 1360.



Whether the *Salic Law* were or were not valid, no advantage could be gained by Edward. There stood in his way the daughter of Louis X., three daughters of Philip V., and one of Charles IV. Aware of this, Edward III. set up a distinction, that although females were themselves excluded from the succession by the Salic

Law, the same rule did not apply to their male issue. But this was contrary to the commonest rules of inheritance, and if it applied at all would have given the crown to Charles the Bad in preference to Edward.

1340.—Naval victory of Sluys.
1345.—Victory of Auberoche.
1346.—Victory of Cressy, and (over the Scots) of Nevil's Cross.
1347.—Capture of Calais.
1355.—Ravage of South of France.
1356.—Victory of Poictiers and capture of King John.
1359.—Unsuccessful siege of Rheims.

12. State when each of the following lived, and for what he was noted:—

Chaucer, Sir Thomas Fairfax, Hereward, John Locke, Sir Charles Napier, Sir Isaac Newton, Lord Palmerston, Pope, Sir Joshua Reynolds.

Person.	Period.	For what Noted.
Chaucer	1328—1400	Father of English Poetry. Author of 'Canterbury Tales.'
Sir Thomas Fairfax	1611—1671	A celebrated 'Parliamentary' general.
Hereward	circa 1071	Camp of Refuge in Isle of Ely.
John Locke ...	1632—1704	Metaphysical Writings. 'Human Understanding,' 'Thoughts on Education,' &c.
Sir Charles Napier.	1786—1860	Naval services and writings. (Not to be confounded with his cousin Sir Charles James Napier.)
Sir Isaac Newton...	1642—1727	Discoverer of Gravitation and many other natural laws.
Lord Palmerston ...	1784—1865	Sometime Premier. Vigorous foreign policy.
Pope (Alexander)...	1688—1744	Original and translated poetry. Smoothness of versification.
Sir Joshua Reynolds	1723—1792	Portrait Paintings.

13. What events led to the Battle of Waterloo? Describe it.

By the Treaty of Paris, 1814, Napoleon was allowed to keep the title of Emperor and the Isle of Elba, but in March, 1815, he landed in France, and was at once acknowledged through the whole country. A coalition having been formed against him, Wellington heading 80,000 men and Blucher 100,000, Napoleon marched into Belgium on June 14th with 130,000 men, with the hope of crushing his enemies in detail. On June 16th Wellington defeated Marshey Ney at Quatre Bras, but Napoleon overcame Blucher at Ligny. Wellington then fell back upon Waterloo, which he engaged to hold until Blucher should arrive, and here on Sunday, 18th June, the great and decisive battle of Waterloo was fought.

Napoleon had 80,000 men and 252 guns against Wellington's 72,000 men and 186 guns, but the former's forces were of one nation, and veterans, whilst the latter's contained one-fourth of raw foreigners.

The combat commenced at eleven, and raged with intense fury until half-past seven. The strategy was quite simple, impetuous attack on the French part, and stubborn defence on the English side—on the one hand endeavour to overwhelm, and on the other determination to withstand until the Prussians arrived.

The battle storm swept the fiercest over the English advanced posts at La Haye Sainte and Hougomont. The first of these fell after a stubborn resistance, but the latter survived every attack.

Meanwhile over impeding cross roads Blucher was painfully plodding, and at last when the final attack of the Imperial Guard upon the English had been repulsed, was seriously menacing and pushing the French rear.

With rare judgment Wellington ordered a general advance, and the whole of the French positions were carried. A general rout ensued, and the Prussians energetically pursued, inflicting great slaughter and preventing any rallying. The loss of the allies was 22,000, of the French, 40,000.

14. (*a*) Name the chief events in the reign of Charles II., and (*b*) give the character of that king.

(*a*) 1660.—Accession of Charles, Feudal System abolished.
1661-1665.—Clarendon Code passed.
1665-1667.—Dutch War.
1665.—Great Plague.
1666.—Great Fire of London.
1679.—Habeas Corpus Act passed.
1683.—Rye House Plot discovered. Execution of Russell and Algernon Sidney.

(*b*) Charles was both an infamous man and a bad king. His career was one of most ostentatious profligacy, and his court, under his example, was more impure than that of an Oriental despot.

His good temper was merely indolence, and his absence of cruelty did not impel him to protect innocence from torture and death. A Romanist at heart, he professed himself a Protestant, and as an English king he sold his country to France, and betrayed her to the Dutch by squandering the naval supplies.

Truly it may be said of him that he descended (?)

'To the vile dust from whence he sprung,
Unwept, unhonoured, and unsung.'

School Management.

Two hours and a half are allowed for this Paper. All Candidates must answer Question 2, and not more than SEVEN *other questions.*

1 (*a*) What is a Criticism Lesson? (*b*) Under the head of 'Discipline,' what points would you attend to in such a lesson?

(*a*) A *Criticism Lesson* is one attempted to be given to a class in a model manner in the presence of young or inexperienced teachers (either by one of their number, or a more skilled person) in order that its excellencies may be noted and its deficiencies criticised, and that thereby both the critics and the criticised may attain to a higher level in the Art of Teaching.

(*b*) Was outward order and apparent attention preserved, if so, how? Was the teacher too severe in manner or too infirm? Was he fitfully repressive and occasionally lax? Was the discipline of a refined kind, neither showy nor fussy?

Did the teacher influence rather than compel the will of the scholars? In other words, was the obedience rendered cheerfully, work done honestly, and with a sense of responsibility, and did a good general tone obtain?

2. Write notes of a lesson on *one* of these subjects:—

(*a*) The commercial importance of the Rhine, Vistula and Danube.

(*b*) Cardinal Wolsey.

(*c*) Interest of money.

(*d*) Sugar (*Infants*).

INTEREST OF MONEY.

GENERAL HEADS.	DETAIL AND METHOD.
I. What is interest?	The Post Office Savings Bank adds 6d. a year for every pound deposited. A man borrows £1,000 on a house and pays £40 per year for its use only, and not as an instalment towards repayment. Interest is therefore money paid by a borrower to a lender for the loan of a certain amount. The money lent is called the *Principal*.
II. How generally reckoned?	It is generally agreed that so much shall be given for every £100 or fraction of £100, and this is called so much per cent. (centum = 100). Thus if £4 be given for the use of £100, or £2 for the use of £50, this is at the rate of 4 per cent. Ask a few mental arithmetic questions in order to illustrate and assist the memory.
III. Why can interest be paid?	Because money in the long run represents labour, and the benefits of labour may continue years after the work has been executed. Thus a farmer may borrow £100 at 4 per cent. to *drain* his fields. By means of this his land is permanently improved by, say, £8 per year, &c.
IV. High interest means bad security	Money can now be borrowed on good security (*explain security*) at 4 per cent., but if there is any considerable chance that the principal will not be repaid, the interest must be higher in proportion to the risk. Read from newspaper share-list the rates at which different Governments borrow.

3. In giving a lesson on the Duke of Wellington, show what use you would make of *comparison and contrast* with any other character in history.

The prominent qualities of the 'Great Duke' were patriotism, sense of duty, justice, regard for the lives of men; and concerning these he stands out in marked contrast with his famous antagonist, Napoleon.

Wellington fought for his country, Napoleon for himself; the former calmly retired into civil life; the latter raised himself on the ruins of liberty to the imperial throne. The Englishman was prompted by duty, the Corsican by ambition and caprice; Wellington was actuated by justice, whilst Napoleon despoiled people at his will; the one husbanded the lives of his men and wept for grief over the victorious field of Waterloo; the other lavishly sacrificed his soldiers and considered them 'food for cannon.'

The chief incidents in the lives of these two chiefs will abundantly illustrate the above points.

4. What rules have you learnt to observe in giving out Dictation?

(1) To read slowly, clearly, and with proper emphasis the selected extract.

(2) To insist upon a simultaneous commencement.

(3) To break up the 'passage' into short lengths suitable to the given class.

(4) To coincide these divisions with the structure of the passage.

(5) So to regulate the pace that none may be hurried or retarded.

(6) To give out each section only once.

(7) To allow no wandering glances.

5. After a class has reproduced in writing a short story which you have previously read to them, what is your method of revising the exercises?

Every exercise should be carefully marked by the teacher himself, whilst the class is engaged in a little private study, as recommended in 'Instructions to Inspectors,' each boy being present at the marking of his book. During the process specially applicable remarks should be made to the individual, and various exercises containing typical mistakes, weaknesses or excellencies, should be set aside.

The marking over, a few minutes ought to be spent in general teaching respecting the selected points exemplified in the reserved books.

6. Give some hints for making oral exercises in Arithmetic interesting.

(1) Make them as practical as possible.

(2) Break up fresh ground as much as may be.

(3) Let them be parts of a well conceived system.

(4) Connect them with the work of the next higher class.

(5) Appeal to the imagination as to the working, so that the scholars may learn to imagine a worked out operation as they do a map.

(6) Arouse among the pupils a spirit of generous emulation.

(7) Don't neglect the dullards.

7. (*a*) Give a short list of the different kinds of books which you would expect ordinary boys and girls to be able to read by themselves immediately after quitting the day school, say at the age of 13. (*b*) Mention some good books which you think are rather too difficult for such children.

(*a*) Ordinary travels or voyages, as 'Voyage of Sunbeam.'
The more narrative and less metaphysical novels, as C. Kingsley's 'Hereward.'
The historical books of the Bible.
Essays, such as C. Lamb's, and such books as Sir Roger de Coverley.
Serials, like Chambers' 'Miscellany' or 'Boys' Own Paper.'
Poems, such as Longfellow's.

(*b*) Stanley's 'In Darkest Africa.'
Scott's and Lytton's Historical Novels.
The prophecies and epistles of the Bible.
Don Quixote and Washington Irving's writings.
Such serials as 'All the Year Round.'
Poems like Tom Moore's 'Lalla Rookh.'

8. In preparing a lesson upon a comparison between the present condition of Great Britain and that of France, Germany, *or* the United States, state what classes of facts you could wish to procure, and in what books you would seek them. Give an example of a sketch which would exhibit your facts in tabular form on the black board.

GREAT BRITAIN *versus* THE UNITED STATES.

[The question is altogether an unpractical one, and which an experienced teacher would not have been guilty of setting. Not one but many lessons would be required to deal even superficially with the subject, as is betrayed by the middle portion of the query.]

We should require to know the condition of each country as regards peace, the relation between income and expenditure, the status of labour, the volume of exports and imports, the commercial policy of the nation, the density of the population, the pressure of public burdens, the state of sanitation, and the measure of pauperism, crime and education.

Such information can be obtained from such books as Whitaker's Almanac, Government Returns, newspapers, works of impartial foreigners, and State records. As it is the *present* condition spoken of, not many volumes can exist about it.

TABULAR SKETCH.

CLASSES OF FACTS	ENGLAND.	UNITED STATES.
Political:		
Financial ...	Income exceeds expenditure	Income exceeds expenditure ... ...
External affairs	Relations more complicated	Uninvolved ... ...
Internal affairs	The Irish difficulty...	Public indifference of many worthy citizens
Social:		
Sanitation ...	More advanced in theory	Practically equal
Dwellings, &c.	Inferior	
Food, Clothing	On a level	
Status of labour	Ditto	
Pauperism, &c.	Greater	
Density of population	Ditto	
Moral, &c. ...		
Religious enterprise	Greater	
Crime ...	Less...	A more lawless spirit
Public spirit ...	Patriotic	Corrupt
Education ...	Vastly progressive ...	Superficial

9. In what ways may success in Class Teaching be promoted by studying the characters of children?

(1) The more difficult questions may be apportioned to the acuter scholars.

(2) Special knowledge or faculty of any individual may be utilised.

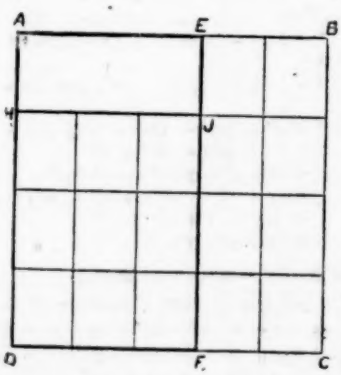
(3) Dullards may be encouraged by securing to them a little public success.

(4) General interest may be excited by the contagious example of judiciously exhibited scholars.

(5) Loss of time and friction may be avoided by knowledge of idiosyncracies.

10. Explain any way you know of making clear to the eye the process called multiplying $\frac{3}{5}$ by $\frac{1}{4}$.

Construct any rectangle ABCD and divide it into five vertical columns and four lateral ranks. Then it will plainly contain 20 equal squares.



Of the whole rectangle, AF is evidently three-fifths, as it comprises three of the five vertical columns.

Of the rectangle AF, AJ is plainly $\frac{1}{4}$, as it embraces one of the four lateral ranks.

Therefore, AJ being $\frac{1}{4}$ of AF which is $\frac{3}{5}$ of AC = $\frac{1}{4}$ of $\frac{3}{5}$ of AC.

But AJ is $\frac{3}{20}$ of AC, for it contains three of the 20 squares.

Therefore $\frac{3}{20}$ of AC = $\frac{1}{4}$ of $\frac{3}{5}$ of AC; and we find that in general $\frac{3}{20}$ of any rectangle is $\frac{1}{4}$ of $\frac{3}{5}$ of that rectangle.

11. After explaining to a class the effect of mountain ranges upon climate, show how you might lead the children to seek farther proofs for themselves.

The chief influences which mountains exert upon the climate of their localities are:—

(1) They form barriers between hot or cold winds.

(2) They add to the humidity of the climate, and more especially so when forest-clad.

(3) When they run from east to west, their southern slopes are warmer than the northern.

(1) The tempering effects of mountain barriers may be easily illustrated by the results accruing from the placing of a large screen near a fire or near the door.

(2) The steam from a kettle condensed by contact with a cold plate will explain the fogs and rains occurring upon mountain summits; whilst the shelter afforded by trees during a storm and the *drip* from the trees outlasting that from the skies, will show how moisture is retained.

(3) Any small eminence, or even a roof running from east to west, will make the fact clear that southern slopes are warmer than northern.

12. What is an Object Lesson? Show that mere sight is not necessarily knowledge.

An Object Lesson is one upon some concrete thing, an example of which is generally present to be experimented upon by the senses. The intention of these lessons is not only to train the observing faculties, but to make the pupils more familiar with circumstances incidental to their environment.

Mere sight is not necessarily knowledge, because—

I. Many properties of matter are not cognisable by the sight, such as the coldness of marble.

II. The sight itself, in matters of seeing, is not a trustworthy guide until trained by experience to allow for the effects of position, distance, light and shade, &c.

13. In giving a lesson on a river, which is the better plan—to speak first of a particular river which the children have seen, or to start with a definition and a general description. Give reasons for your opinion,

Undoubtedly the better plan is to speak first of a particular river about which the children must have observed something than to commence with some such, to them unintelligible, definition as 'A river is a stream of fresh water flowing over the land.'

Thereby we appeal to the scholars' experience and link on the unknown of the same kind to that already known. Some children will have noticed the current of the river, others will have drunk thereof, and yet a third section will be able to distinguish a land stream from a movement in the sea or a pond.

Thus all the essentials of a river can be 'trained-out' from experimental observation, viz.:—

That a river is a stream.
That its water is fresh.
That it flows in a channel over the land.

14. Describe the best method of proceeding in teaching a new song to infants *or* to older children.

TO OLDER CHILDREN.

1st. Teach a complete stanza of the words.

2nd. Sing over several times the first musical phrase without words, the children listening and following the strain with the music in hand.

3rd. Next play this phrase upon an instrument. It is far better thus to prevent mistakes than to correct them.

4th. The learners having the melody before them written on the blackboard, should have clearly explained to them any difficulties of time or interval, accompanied by pattern singing of these parts.

5th. Then, after a little more pattern singing by the teacher, the scholars should imitate.

6th. Any faults should be promptly detected, and hesitancy at once remedied, until the phrase can be correctly rendered in musical syllables.

7th. Now the words and melody of this phrase should be combined.

8th. The phrase should be sung to words, and with instrumental accompaniment.

9th. This process should be repeated until all the song be mastered. If the song be in (say) three parts, each part should be taught separately as above, and afterwards the treble and alto should be practised together, and, finally, all the three parts.

Euclid, Algebra, and Mensuration.

Three hours are allowed for this Paper. Marks are given for portions of questions. All generally understood abbreviations for WORDS *may be used, but symbols of* OPERATIONS (*such as* $-$, $+$, $\times$) *are not admissible. Capital letters, not numbers, must be used in the diagrams.*

EUCLID.

1. (*a*) Define *plane rectilineal angle, circle, obtuse-angled triangle, parallelogram, axiom, converse proposition, gnomon.*

(*b*) On the same base, and on the same side of it, there cannot be two triangles that have their sides which are terminated at one extremity of the base equal to one another, and at the same time those which are terminated at the other extremity equal to one another.

(*a*) *Plane rectilineal angle, circle, obtuse-angle triangle, parallelogram,* and *gnomon* are defined in every Euclid.

An *axiom* is a self-evident theorem.

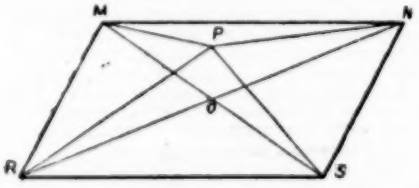
One proposition is said to be the *converse* of another when the whole or part of the hypothesis of the first is the conclusion of the second, whilst the whole or part of the conclusion of the first is the hypothesis of the second. Thus Propositions V. and VI. of the first book are converse to each other.

(*b*) Euclid, I.—VII.

2. (*a*) Any two sides of a triangle are together greater than the third side.

(*b*) The sum of the diagonals of a quadrilateral is less than the sum of any four lines that can be drawn from any point (except from the intersection of the diagonals) to the four angles.

(*a*) Euclid, I., 20.



(*b*) Let MNSR be the given parallelogram, P the given point, and MS and NR the diagonals.

Then PM, PS, PN, PR taken together shall be less than MS and NR taken together.

By I. 20 the sum of PM and PS is greater than MS, and
" " PN and PR " RN;

∴ the sum of PM, PS, PN, PR is greater than the sum of MS and RN. Q.E.D.

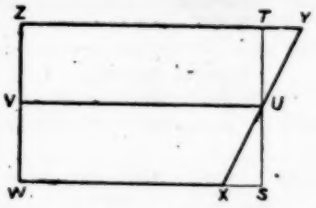
3. (*a*) The opposite sides and angles of a parallelogram are equal to one another, and the diameter bisects it, that is divides it into two equal parts.

(*b*) The line which joins the middle points of the oblique sides of a quadrilateral, two of whose sides are parallel, is equal to half the sum of the two parallel sides.

(*a*) Euclid I., 34.

(*b*) Let ZYXW be a quadrilateral having XY ‖ to WX, the sides ZW and YX oblique, and V and U the middle points of ZW and YX respectively.

Then VW shall be half of the sum of ZY and WX.



Construction.—Through draw TS ‖ to ZW and cutting ZY in T. Produce WX to meet TS in S.

Proof.—∵ ZY ‖ WS ∴ $\angle$ YTU = $\angle$ XSU (I. 29), and $\angle$ YUT = $\angle$ XUS (I. 15), and (by hypothesis) YU = XU.

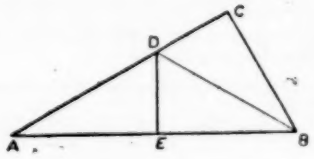
∴ YT = XS (I. 26); ∴ ZY and WX together = XT and WS together.

But by (I. 34) VU is half of the sum of XT and WS,
∴ VU " " ZY and WX.
Q.E.D.

4. (*a*) In every triangle the square on a side subtending an acute angle is less than the squares on the side containing that angle, by twice the rectangle contained by either of these sides, and the straight line intercepted between the perpendicular let fall on it from the opposite angle, and the acute angle.

(*b*) If ABC be a triangle in which C is a right angle, and DE be drawn from a point D in AC at right angles to AB; prove that the rectangles AB . AE and AC . AD will be equal.

(*a*) Euclid II., 13.



(*b*) *Construction.*—Join BD.

Then by II., 13 the sq. on BD = the sum of the squares on BA and AD less twice the rect. BA . AE.

Similarly by II., 13 the sq. on BD = the sum of the squares on BA and AD less twice the rect. DA . AC.

∴ the sum of the squares on BA and AD less twice the rect. BA . AE = the sum of the squares on BA and AD less twice the rect. DA . AC.

∴ rect. BA . AE = rect. DA . AC. Q.E.D.

ALGEBRA.

5. (*a*) Prove that

$(x+y+z)^3 - 6xyz = (x+y)^3 + (y+z)^3 + (z+x)^3 - x^3 - y^3 - z^3$; or that—

$(x+y+z)^3 = (x+y)^3 + (y+z)^3 + (z+x)^3 - x^3 - y^3 - z^3 + 6xyz.$

$$\begin{aligned}(x+y+z)^3 &= x^3 + 3xy^2 + 3xy^2 + y^3 + 3zy^2 + 6xyz + 3zx^2 \\ &\quad + 3z^2y + 3z^2x + z^3 \\ &= (x+y)^3 + 3z(x^2 + 2xy + y^2) + 3z^2(x+y) + z^3 \\ &= (x+y)^3 + 3z(x+y)^2 + 3z^2(x+y) + z^3 \\ &= \{(x+y)+z\}^3 \\ &= (x+y+z)^3\end{aligned}$$

(*b*) Find the greatest common measure of

$x^3 - 3x^2 + 4x - 2$ and $x^3 + 2x^2 - 4x + 1$

$x^3 - 3x^2 + 4x - 2 = x^3 - x^2 - 2x^2 + 2x + 2x - 2 = x^2(x-1) - 2x(x-1) + 2(x-1) = (x^2 - 2x + 2)(x-1)$, and

$x^3 + 2x^2 - 4x + 1 = x^3 - x^2 + 3x^2 - 3x - x + 1 = x^2(x-1) + 3x(x-1) - 1(x-1) = (x^2 + 3x - 1)(x-1)$.

Now as $x^2 - 2x + 2$ and $x^2 + 3x - 1$ are prime to each other,
∴ $x - 1$ = G.C.M. Ans.

6. (*a*) Prove that $\frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc}$ where the letters denote *any* numbers.

Let $x = \frac{a}{b} \div \frac{c}{d}$

Then $x \times \frac{c}{d} = \frac{a}{b} \div \frac{c}{d} \times \frac{c}{d} = \frac{a}{b}$

and $x \times \frac{c}{d} \times \frac{d}{c} = \frac{a}{b} \times \frac{d}{c}$

$\therefore x = \frac{ad}{bc}$

$\therefore \frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc}$.

(*b*) Simplify—

$$\left\{\frac{a + \frac{b^2}{a}}{a+b} - \frac{a-b}{a-\frac{b^2}{a}}\right\} \div \frac{1 - \frac{a}{b}}{1 - \frac{a^2}{b^2}} =$$

$$\frac{\left(a + \frac{b^2}{a}\right)\left(a - \frac{b^2}{a}\right) - (a+b)(a-b)}{(a+b)\left(a - \frac{b^2}{a}\right)} \times \frac{1 - \frac{a^2}{b^2}}{1 - \frac{a}{b}} =$$

$$\frac{a^2 - \frac{b^4}{a^2} - a^2 + b^2}{\frac{(a+b)(a^2-b^2)}{a}} \times \frac{1 + \frac{a}{b}}{1} =$$

$$\frac{-b^4 + a^2b^2}{a^2} \times \frac{b+a}{b} \times \frac{a}{(a+b)(a^2-b^2)} =$$

$$\frac{b^2(a^2-b^2)}{a} \times \frac{1}{b(a^2-b^2)} = \frac{b}{a}.$$ Ans.

7. Solve the equations

$$(a)\ \frac{9}{x+1} - \frac{3(x-1)}{x-2} + \frac{3x}{x+2} = 0$$

$$\frac{3}{x+1} - \frac{x-1}{x-2} + \frac{x}{x+2} = 0$$

Multiplying by $(x+1)(x-2)(x+2)$ we have—

$$3x^2 - 12 + x^3 - x^2 - 2x - x^3 - 2x^2 + x + 2 = 0$$

$$-x - 10 = 0$$

$$x = -10.$$ Ans.

$$(b)\ x + \frac{y}{11} = 71$$

$$y - \frac{x}{13} = 61$$

$$\therefore 11x + y = 781$$

$$13y - x = 793$$

$$143x + 13y = 10153$$

$$-x + 13y = 793$$ (Multiply each side by 13)

$\therefore 144x = 9360$ (by subtr.)

$\therefore x = 65$

But $11x + y = 781$; $\therefore 11 \times 65 + y = 781$; $\therefore 715 + y = 781$; $\therefore y = 781 - 715 = 66$.

$x = 65$, $y = 66$. Ans.

$$(c)\ x - \frac{5}{2} + \frac{1}{x - \frac{1}{2}} = x - 1 + \frac{1}{x-1}$$

$$-\frac{3}{2} + \frac{2}{2x-5} = \frac{1}{x-1}$$

$$(15 - 6x)(x-1) + 4x - 4 = 4x - 10$$ (Multip. each side by $2(2x-5)(x-1)$)

$$-6x^2 + 21x - 15 = -6$$

$$6x^2 - 21x + 9 = 0$$

$$2x^2 - 7x + 3 = 0$$

$$(2x-1)(x-3) = 0$$

$\therefore 2x = 1$

$x = \frac{1}{2}$

and $x = 3$.

$x = \frac{1}{2}$ or 3. Ans.

N.B.—It is interesting for the student to note that the equation will be satisfied if either $x - \frac{1}{2} = x - 1$ [when also $\frac{1}{x - \frac{1}{2}} = \frac{1}{x-1}$]

or if $x - 1 = \frac{1}{x - \frac{1}{2}}$ [when also $\frac{1}{x-1} = \frac{1}{x - \frac{1}{2}}$].

Now that $x - \frac{1}{2} = x - 1$ is manifestly absurd, and we must fall back upon $x - 1 = \frac{1}{x - \frac{1}{2}}$; $\frac{x-1}{1} = \frac{2}{2x-5}$; $2x^2 - 7x + 3 = 0$ as in above solution.

8. A farmer holds two farms, for each of which he pay a rent of 32s. an acre, the total rent being £432. The value of the land falling, the rent of the smaller farm was reduced 2s., and of the larger farm, 7s. per acre, and his total rent was reduced by £64 10s. Find the number of acres in each farm.

N.B. £64 10s. = 1290s.
£432 0s. = 8640s.

Let x = number of acres in smaller and y = number of acres in larger farm.

I. Then former rent of smaller farm in shillings = $32x$, and of larger farm = $32y$, and total rent = $32x + 32y = 8640$, that is $2x + 2y = 540$.

II. Then reduction of rent of smaller farm in shillings = $2x$, and of larger farm = $7y$, and total reduction = $2x + 7y = 1290$

$\therefore 2x + 2y = 540$
$2x = 7y = 1290$
$\therefore 5y = 750$ (by subtraction)
$\therefore y = 150$
But $2x + 7y = 1290$
$\therefore 2x + 7 \times 150 = 1290$
$2x + 1050 = 1290$
$2x = 240$
$\therefore x = 120$

Smaller farm 120 acres.
Larger ,, 150 ,,
Ans.

N.B. The problem might have been worked with one unknown, for total number of acres $= \frac{£432}{32s.} = 270$,

$\therefore$ if x = smaller farm, then $270 - x$ = larger farm, &c.

9. A tradesman started in business with a capital of £1,200, and in the first year he makes a certain percentage of profits, from which he takes £164 and adds the rest to his capital.

In the next year he makes the same percentage of profits, and having withdrawn £1,164 finds he has £1,422 left in the business. What percentage of profit did he make?

Let x in £ = required percentage.

Then 1st year's profit = $12x$
2nd year's capital = $1200 + 12x - 164 = 1036 + 12x$

Then 2nd year's profit = $\frac{x}{100}(1036 + 12x)$

Then 3rd year's capital = $\frac{x+100}{100}(1036 + 12x) - 164 = 1422$ (by hypothesis)

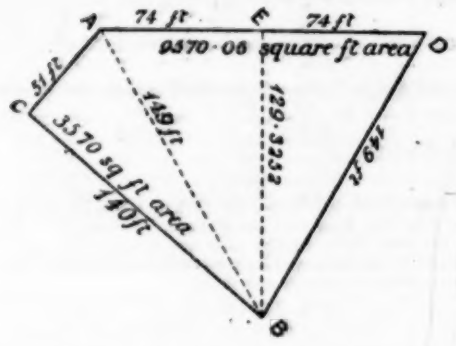
$$\therefore \frac{x+100}{100}(1036 + 12x) = 1586$$

$$(x + 100)(1036 + 12x) = 158600$$
$$12x^2 + 2236x + 103600 = 158600$$
$$3x^2 + 559x + 25900 = 39650$$
$$3x^2 + 559x - 13750 = 0$$
$$3x^2 - 66x + 625x - 13750 = 0$$
$$3x(x - 22) + 625(x - 22) = 0$$
$$(3x + 625)(x - 22) = 0$$
$\therefore 3x + 625 = 0$
$x = -208\frac{1}{3}$,
and $x - 22 = 0$
$x = 22$.

The first value of x (*viz.*, $-208\frac{1}{3}$) is inadmissible.

$\therefore$ Ans. is 22 per cent.

MENSURATION.



10. The sides of a quadrilateral are 51, 140, 148, 149 feet respectively, and the angle between the first two is a right angle. Find the area to two places of decimals.

I. $AB = \sqrt{(51)^2 + 140^2}$
$= \sqrt{2601 + 19600}$
$= \sqrt{22201}$
$= 149$ ft.

II. Area of $ABC = 51 \times 70 = 3570$ sq. ft.

III. $EB = \sqrt{(149)^2 - (74)^2}$
$= \sqrt{22201 - 5476}$
$= \sqrt{16725}$
$= 129{\cdot}3252$ slightly in excess.

IV. Area of $ADB = 129{\cdot}3252 \times 74 = 9570{\cdot}06$ sq. ft.

V. Total area $= 35{\cdot}70 + 9570{\cdot}06 = \underline{1314{\cdot}06 \text{ sq. ft.}}$ Ans.

11. The circumference of a circular reservoir is 553½ yards, and the area that it occupies on a map is 1¼ sq. inches. Find the scale on which the map is drawn, measured by inches per mile.

($\pi = \frac{22}{7}$)

$\frac{c^2}{4\pi}$ = area.

$\therefore \left(\frac{3872}{7}\right)^2 \div \frac{4 \times 22}{7}$ = area of circle in sq. yards

$\frac{3872 \times 3872 \times 7}{7 \times 7 \times 4 \times 22}$ = " "

$\frac{44 \times 3872}{7}$ sq. yds = " "

$\therefore \sqrt{\frac{44 \times 3872}{7}}$ sq. yds. = side of sq. = to area.

But $\sqrt{1\frac{1}{4}}$ sq. ins. = area on map;

$\therefore$ scale as a fraction of a mile $= \sqrt{1\tfrac{1}{4} \div \frac{44 \times 3872 \times 9 \times 144}{7}}$

$= \sqrt{1\tfrac{1}{4} \times \frac{7}{44 \times 3872 \times 9 \times 144}}$

$= \sqrt{\frac{1}{2 \times 2 \times 2 \times 2 \times 1936 \times 9 \times 144}}$

$= \sqrt{\frac{1}{(4)^2 \times (44)^2 \times (3)^2 \times (12)^2}}$

$= \frac{1}{4 \times 44 \times 3 \times 12}$

$= \frac{1}{10}$ inches to the mile.

Arithmetic.

MALE CANDIDATES.

Three hours allowed for this Paper. Candidates may not answer more than THREE *of the sections under Question 1, and may answer* ELEVEN *other questions.*

The solutions must be given at such length as to be intelligible to the Examiner, otherwise the answer will be considered of no value.

1. (*a*) Prove the rule for division when the divisor is a number larger than twelve; (*e.g.*, 36924 ÷ 79)

	hund.	tens	units	hund.	
79)	369	— 2	— 4	(4	
	316				tens
	532	tens		(6	
	474				units
	584	units		(7$\frac{31}{79}$	
	553				
	31 rem.				

hund. tens. units
$\underline{(4 - 6 - 7\frac{31}{79}}$. Ans.

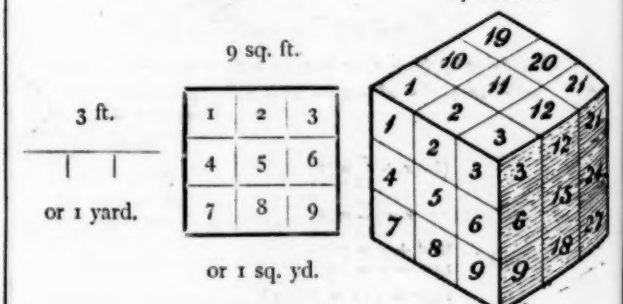
36924 = 369 hund. + 2 tens + 4 units. Into the hundreds 79 will go 4 times, and as the dividend is hundreds so must this quotient (4) be hundreds. There are 53 hundreds remaining, which together with the two tens = 532 tens. Into these tens 79 will go 6 times, and as the dividend is tens so must this second quotient (6) be tens. There are 58 tens remaining, which with the 4 units = 584 units. Into these units 79 will go 7 times, and as the dividend is tens, so must this third quotient (7) be units. There are 31 remaining, which is evidently fractional, and equals 31 seventy-ninths.

To test the working 467 may be multiplied by 79, and 31 added in. The product will be 36924.

(*b*) How would you explain to children beginning cubic measure that 27 cubic feet make a cubic yard?

Cubic measure should of course be subsequent to Long Measure and Square Measure, and thus the children will be already conversant with the measurement of space of one and two dimensions. They will understand *theoretically* that just as they have been taught that $(3)^1$ is the measure of a certain straight line, so $(3)^2$ is the measure of a certain space of two dimensions, and carrying out the analogy that $(3)^3$ is the measure of a space of three dimensions.

But more important still is *practical* demonstration. There should be exhibited a strip of wood trisected to represent three feet, a square area of three feet side, showing the 9 interior and equal squares each representing a square foot, and lastly, 27 small cubes, each representing 1 cubic foot, and which, packed 3 long, 3 broad, and 3 deep, would compile the cubic foot.



(*c*) Prove to a class beginning multiplication of fractions that if the numerator and denominator of a fraction be both divided by the same number, the value of the fraction will not be altered (*e.g.*, $\frac{4}{8} = \frac{2}{4}$. Illustrate by half-crowns and sixpences).

$\frac{15}{40 \div 5} = \frac{15}{8}$. Now the more we diminish a divisor the greater will be the quotient, and in this case the quotient is evidently five times too much. Rectifying this error, we divide 15 eighths by 5, and get as correct quotient three-eighths.

The operation may be also illustrated by dividing a line first into eighths, and next into fortieths, and showing that 15 of the fortieths are exactly 3 of the eighths.

In a £ there are 8 half-crowns, and therefore 3 half-crowns is $\frac{3}{8}$£.

In a £ there are also 40 sixpences, $\therefore$ 15 sixpences = $\frac{15}{40}$£.

but 3 half-crowns = 15 sixpences. $\therefore \frac{3}{8}$ £ = $\frac{15}{40}$ £.

(*d*) Give reasons for the rule for finding the discount of a given sum due a given time hence at a given rate per cent. simple interest; (*e.g.*, the discount of £299 15s. due 3 years hence at 3 per cent. per annum simple interest.)

The discount equals the principal minus the present worth.

Now as £100 in 3 years at 3 per cent. will become £109, it is plain that £100 now is worth £109 in 3 years hence. Thus £100 is the present worth, and £9 the discount of £100 under the given conditions.

So proportionally we ask if the discount of £109 be £9 what will be the discount of £299 15s.?

As £109 : £299 15 :: £9 : x

$$\frac{4}{436}\quad\frac{4}{1199}\quad 4\,|\,\underline{£99}$$
$$4\qquad 11\qquad\quad £24\ 15\ 0$$

In general A. (£100 + I.) : P :: I : Discount.

2. Two steamers leave a place at the same time for the same port, distant 1,260 miles. The faster steamer averages 11½ miles an hour, and arrives at the port 28 hours before the other. What did the latter vessel average an hour?

$$\text{Time} = \frac{\text{Distance}}{\text{Rate}}.$$

∴ Time by faster steamer $= \frac{1260}{\frac{45}{4}}$ hrs. $= \frac{1260}{1} \times \frac{4}{45} = 112$ hrs.

∴ Time by slower steamer = (112 + 28) hours = 140 hours

$$\text{Rate} = \frac{\text{Distance}}{\text{Time}}$$

∴ Rate of slower steamer $= \frac{1260}{140}$ miles per hour = 9 miles per hour. Ans.

3. An equal number of sovereigns, half-crowns and pence amount to £19 3s. 11d. What is the number?

1 sovereign	=	£1	0 0
1 half-crown	=	0	2 6
1 penny	=	0	0 1
£1 + 1 h.-c. + 1d.	=	£1	2 7

How many times is £1 2 7 comprised in £19 3 11?

$$\frac{£19\ 3\ 11}{£1\ 2\ 7} = \frac{4807}{271} = \underline{17 \text{ times.}} \text{ Ans.}$$

4. Find by Practice the cost of a fence 3 furlongs 9 poles 2¾ yards long, at £205 6 8 per mile.

2 furls. of 1 ml.	= ½	£205	6	8 = cost of mile
1 ,, of 2 furls.	= ½	51	6	8 = cost of 2 furls. 0 pls. 0 yds.
8 pls. of 1 ,,	= ⅛	25	13	4 = ,, 1 ,, 0 pls. 0 ,,
1 pole of 8 poles	= ¼	5	2	8 = ,, 0 ,, 8 pls. 0 ,,
2¾ yds. of 1 pl.	= ½	0	12	10 = ,, 0 ,, 1 pls. 0 ,,
		0	6	5 = ,, 0 ,, 0 pls. 2¾ yds.
		£83	1	11 = cost of 3 furls. 9 pls. 2¾ yds.

5. If 68 oranges be worth 51 buns and 28 buns be worth 10½ lbs. of sugar, what is the value of 64 oranges when sugar is 2½d. per lb.?

Then 4 oranges = 3 buns; and 4 buns = 1½ lbs. of sugar; and 1 lb. of sugar = 2½d.

Then 64 oranges = 48 buns; and 48 buns = 16 lbs. of sugar; and 16 lbs. of sugar = 3s. 4d. Ans.

6. If 14 cwt. 3 qrs. 6 lbs. 9 ozs. cost £509 8s. 3¾d., what will 11 cwt. 24 lbs. 15 ozs. cost?

14 cwt. 3 qrs. 6 lbs. 9 ozs. = 26537 lbs.
11 cwt. 0 qrs. 24 lbs. 15 ozs. = 20111 lbs.
£509 8s. 3¾d. = 489039 farthings.
As 26537 : 20111 :: 489039 farthings.
(Cancelling by 119) 223 : 169 :: 489039 ,,
(Cancelling by 223) 1 : 169 :: 2193 ,,
farthings 2193 × 169 = farthings 370617 =
d. 926544 =
s. 7721 2¼
£ 386 1 2¼. Ans.

7. Simplify

$$\frac{1\frac{3}{17} + \frac{21}{119}}{\frac{5}{8} + \frac{5}{11}} - \frac{132}{1771} = \frac{\frac{9}{17} + \frac{3}{8}}{\frac{5}{8} + \frac{5}{11}} - \frac{7}{8} =$$

$$\left(\frac{81 + 77}{99}\right) \div \left(\frac{55 + 24}{88}\right) - \frac{7}{8} = \frac{158}{99} \times \frac{88}{79} - \frac{7}{8} =$$

$$\frac{2 \times 8}{9} - \frac{7}{8} = \underline{1}. \text{ Ans.}$$

8. (*a*) Divide ·4214412 by ·002103 =
4214412 by 21030 =
702402 by 3505 = (cancelling by 701)
1002 by 5 =
200·4 Ans.

(*b*) Divide $5\cdot\dot{5}4$ by $3\cdot\dot{3}\dot{8} = 5\frac{6}{11} \div \left(3\,\frac{38 - 3}{90}\right) = \frac{61}{11} \div 3\frac{7}{18} =$

$\frac{61}{11} \times \frac{18}{61} = \frac{18}{11} = \underline{1\cdot\dot{6}\dot{3}}$. Ans.

9. A fruiterer has 889 Spanish and 1,397 Maltese oranges. He put them into boxes, keeping the two kinds of oranges separate, and placing the same number in each box. If the number in each box is the greatest possible, find it.

The number is evidently the G.C.M. of 889 and 1,397.

889	1397
508 (2)	889 (1)
381	508
381 (4)	381 (3)
..	127 = Ans.

10. Reduce

$$\frac{2}{63}\text{ of }\frac{1}{65}\text{ of £81 13s. 4d.} + \frac{2}{41}\text{ of }\frac{2}{95}\text{ of 8s. 10½d.} - \frac{5}{17}\text{ of 9s. 11d.} =$$

$$\frac{2}{63} \times £81\ 13s.\ 4d. + \frac{2}{5} \times 8s.\ 10\tfrac{1}{2}d. - \frac{5}{17} \times 9s.\ 11d. =$$
£4 13s. 4d. + 7s. 1d. − 2s. 11d. =
£5 0s. 5d. − 2s. 11d. = £4 17s. 6d.

11. Two pint measures are filled with milk and water; in one the ratio of milk to water is 6 : 1, in the other 7 : 1. If the contents of each be emptied into a quart measure, find the ratio of milk to water in it.

In first measure the milk is ⅞ of a pint or ⅞ of a quart.

In second ,, ,, ⅞ ,, 7/16 ,,

∴ the total quantity of milk in the quart measure = $\frac{3}{7} + \frac{7}{16}$ qt.

$= \frac{48 + 49}{112} = \frac{97}{112}$ qt.

∴ the total quantity of water in the quart measure = 1 qt. − $\frac{97}{112}$ qt. = $\frac{15}{112}$ qt.

∴ the ratio of milk to water is $\frac{97}{112}$ to $\frac{15}{112}$ or as 97 : 15. Ans.

12. If 18 pumps can raise 2,150 tons of water in ten days, working seven hours a day, in how many days will 16 pumps raise 1,634 tons, working 9 hours a day?

Number of days required by 18 pumps to raise 2,150 tons, working 7 hrs. per day, = 10.

Number of days required by 1 pump to raise 1 ton, working 1 hr. per day, $= \frac{10 \times 18 \times 7}{2150}$ days.

Number of days required by 16 pumps to raise 1,634 tons, working 9 hrs. per day, =

$$\frac{\overset{1}{\cancel{10}} \times \overset{1}{\cancel{18}} \times 7 \times \overset{817}{\cancel{1634}}}{\underset{5}{\cancel{2150}} \times \underset{8}{\cancel{16}} \times 9} \text{ days}$$
$$= \frac{63}{10} = \underline{6\frac{3}{10} \text{ days or } 56\frac{7}{10} \text{ hrs.}} \text{ Ans.}$$

13. Find the exact difference between the simple and compound interest of £6,072 for 3 years at 3½ per cent. per annum.

(*a*) Simple interest =
$£\frac{6072}{1} \times \frac{3}{1} \times \frac{7}{2} \times \frac{1}{100} = £637{\cdot}56$.

(*b*) Compound interest =
First Year £6072 × $\frac{7}{200}$ = £212·52
Second Year £(6072 + 212·52) × $\frac{7}{200}$ = £219·9582
Third Year £(6284·52 + 219·9582) × $\frac{7}{200}$ = £227·656737
Total = £660·134937
Difference = £660·134937 − 637·56
= £22·574937 = £22 11s. 5·98488d. Ans.

14. A man invests part of £2,445 in a Five per Cent. (A) Stock at 120, and the rest in another Five per Cent. (B) Stock at £125. His income from the two investments is £100 per annum. What sum did he invest in each stock? (*Neglect brokerage.*)

Interest on (A) Stock = $\frac{1}{120}$ = $\frac{1}{6}$ = $\frac{400}{2400}$ of principal
,, whole ,, = $\frac{100}{2445}$ = $\frac{20}{489}$ = $\frac{4000}{97800}$,,
,, (B) ,, = $\frac{1}{125}$ = $\frac{1}{5}$ = $\frac{3912}{97800}$,,

∴ Rate of interest on sum invested in (A) Stock = $\frac{88}{97800}$ more than on sum invested in the whole stock.

∴ Rate of interest on sum invested in (B) Stock = $\frac{88}{97800}$ less than on sum invested in the whole stock.

∴ to get average rate, the ratio of cash invested in (A) Stock to cash invested in (B) Stock must be as 88 : 75, or (A) cash = $\frac{88}{163}$ and (B) cash = $\frac{75}{163}$ of £2,445.

i.e., (A) cash = £1,320, and (B) cash = £1,125. Ans.

Latin.

(*Two hours allowed for this Paper.*)

1. His rebus cognitis, Cæsar Gallorum animos verbis confirmavit, pollicitusque est, sibi eam rem curæ *futuram*; magnam se habere spem, et beneficio suo et auctoritate adductum Ariovistum finem injuriis facturum. *Hac oratione habita*, concilium dimisit; et secundum ea multae res eum hortabantur, quare sibi eam rem cogitandem et *suscipiendam* putaret, in primis quod Æduos, fratres consanguineosque sæpe numero ab Senatu appellatos, in servitate atque in ditione videbat Germanorum teneris, eorumque obsides esse apud Ariovistum ac Sequanos intelligebat: quod in tanto imperio Populi Romani turpissimum sibi et reipublicæ esse arbitrabatur. Paulatim autem Germanos consuescere Rhenum transire, et in Galliam magnam eorum multitudinem venire, Populo Romano periculosum videbat.

After these things had been found out, Cæsar strengthened with his words the hearts of the Gauls, and promised that he would carefully consider the matter; (saying) that he had great hope that Ariovistus, by his (Cæsar's) good deeds and authority, would be induced to put an end to his wrong-doings. After this oration had been delivered, he dismissed the conference; and, besides those statements, many things led him to think that he ought to consider and take the management of this affair, especially as he saw that the Æduí, who had often been styled 'brothers' and 'kinsmen' by the Senate, were held in the slavery and thraldom of the Germans, and understood that their hostages were with Ariovistus and the Sequani, which, in such an empire as that of the Roman people, he considered to be most disgraceful both to himself and to the republic. Moreover, he saw that if the Germans should become gradually accustomed to cross the Rhine and to settle in great numbers in Gaul, it would be full of danger to the Roman people.

2. Parse the words italicised in the above:—

Futuram—Verb (*sum, esse, fui*), intrans., fut., partic., fem., sing., agreeing with *rem*.
Suscipiendam—Verb, trans., 3rd in -io (*suscipio, suscepi, susceptum*), gerundive, partic., agreeing with *rem*.
Hac—Dem. pro. (*hic, hæc, hoc*), sing., 3rd, fem., abl., agrees with *oratione*.
Oratione—Com. noun, 3rd declens. (*oratio, -onis*), sing., 3rd, fem., abl., abs., modifies *dimisit*.
Habita—Verb, 2nd conj. (*habeo, -ui, -itum*), trans., pass., part., perf., sing., 3rd, fem., qual. *oratione*.

3. Give the mood and tense of 'sublati,' 'poterant,' 'liceret,' 'profectus est,' and their principal parts.

Sublati [sunt]. Indicat. perf. (tollo, tollere, sustuli, sublatum).
Poterant. Indicat. imperf. (possum, potui, posse).
Liceret. Subjunctive imperf. (licet, licuit, licēre).
Profectus est. Perfect. indicat. (proficiscor, -i, profectus sum).

4. Decline 'triplex acies,' and 'longum iter.'

	Singular.	Plural.
N.	Triplex acies.	Triplices acies.
G.	Triplicis aciei.	Triplicum.*
D.	Triplici aciei.	Triplicibus.*
Acc.	Triplicem aciem.	Triplices acies.
V.	Triplex acies.	Triplices acies.
Abl.	Triplice acie.	Triplicibus.*

* Acies only occurs in the N., Acc., and V. cases in the plural.

	Singular.	Plural.
N.	Longum iter.	Longa itinera.
G.	Longi itineris.	Longorum itinerum.
D.	Longo itineri.	Longis itineribus.
Acc.	Longum iter.	Longa itinera.
V.	Longum iter.	Longa itinera.
Abl.	Longo itinere.	Longis itineribus.

5. Quum sic respondisset, decessit, or abiit, or responso dato, decessit or abiit.

	Singular.			Plural.		
	Mas.	Fem.	Neut.	Mas.	Fem.	Neut.
N.	Is	ea	id	Ii or ei	eae	ea
G.	Ejus	ejus	ejus	Eorum	earum	eorum
D.	Ei	ei	ei	Eis or iis	eis or iis	eis or iis
Acc.	Eum	eam	id	Eos	eas	ea
V.	Is	ea	id	Ii or ei	eae	ea
Abl.	Eō	eā	eō	Eis or iis	eis or iis	eis or iis

Is means 'this,' and 'he,' 'she,' 'it,' referring to the words in the context of a sentence.
Ille means 'that yonder,' or 'near him.'
Iste means 'that near you.'
Se means 'himself, itself, or herself,' &c., and refers to the subject of the sentence in which it is used.

7. In what year did the events recorded in 'De Bello Gallico' I. take place?

In the consulship of L. Calpurnius Piso and A. Gabinius, B.C. 58.

Domestic Economy.

(*Two hours and a half are allowed for this Paper. Candidates are not permitted to answer more than* ONE *question in each section.*)

Section I.

Needlework.

1. A useful outfit has to be provided for a school girl 14 years of age, who is going into domestic service as a nursemaid. State what garments you would give her, the kind and amount of materials to be used in each garment, and the cost (in detail) of the outfit.

In providing a *nursemaid* with a proper outfit the chief points to be observed are:—

(1) *Underlinen* must be good, and sufficient to cover the intervals between washing days.

(2) There will be certain portions of the clothing, as aprons, caps, walking out clothing, &c., which will be decided by the requirements of the mistress. The caps, aprons, slippers, waterproof, &c., are stated, in view of these possibilities. A nursemaid will require to be especially tidy both when in the house, and also when in charge of her little ones out of doors. Many of the articles named will of course be provided by a careful mother from material in hand, but the appended list gives most things as having to be bought. Poor and cheap materials should be avoided.

As this is an entirely new outfit, it is assumed that the girls' previous clothing will devolve upon her younger sisters.

	s.	d.
Underlinen—		
3 chemises—6 yds. grey or scoured calico, at 4d. ...	0	2	0
3 prs. drawers ,, ,, ,, ,, ...	0	2	0
2 night dresses ,, ,, ,, ,, ...	0	2	0
2 petticoats—5 yds. scarlet flannel, at 1s.	0	5	0
2 skirts—One for regular wear made out of old dress, 2½ yds. skirting at 10d.	0	2	5
3 pairs knitted stockings; 1 lb. of Scotch wool at 3s. will knit and give wool for mending	0	3	0
2 print dresses—14 yds. at 6d.	0	7	0
1 best dress—5 yds. cashmere, at 2s.	0	10	0
1 afternoon dress—7 yds. at 10d.	0	5	10
Lining for both—6 yds. skirt lining, at 4d.; 4 yds. bodice lining, at 5d.; buttons, 7d.	0	4	3
Calico for lining print dresses	0	2	6
3 calico bodices—3 yds. at 4d.	0	1	0
2 hats	0	8	0
2 pairs gloves—1 cotton, 6d.; 1 taffeta, 1s.	0	1	6
2 pairs boots—strong, 7s. 6d.; best, 10s.	0	17	6
2 jackets—1 thick, 1 thinner	0	15	0
1 waterproof (should have good one)	0	7	6
1 umbrella (alpaca the best)	0	5	0
1 pair slippers	0	2	6
12 pocket handkerchiefs	0	3	0
Aprons—6 holland ones, large, 9 yds. at 6d. ...	0	4	6
7 muslin (if asked for), 7 yds. at 6d.	0	3	6
2 rough, 3 yds. at 6d.	0	1	6
Caps—If required—2 yds. muslin, 6d.; lace, 3d....	0	0	9
Comb and brush	0	1	6
Soiled clothes bag, 6d.; sundries, 9d.	0	1	3
	£6	0	0

2. By what means could you make worn sheets and tablecloths fit for further use, or how could you otherwise utilise them?

(1) *Sheets* may have the thin places darned. When too bad for this they should be neatly patched. Sheets generally go thin first in the centre. A good plan is to cut down the centre, then join together the outer edges and hem what will be the new sides. After cutting up the centre, a strip of the thin portion might be cut off, then the remainder joined, hemmed, &c., to form a sheet for a cradle, crib, or smaller bed. When quite exhausted, the best portions may be cut up, and hemmed round for dusters, or joined together to make dust covers for the furniture.

(2) *Tablecloths* should be darned with the diagonal darn when they get cut, as they often do; plain darn, when worn thin. One tablecloth may be used to mend another, but patches do not look very neat, as it is difficult to match the pattern; nevertheless, economy is to be studied, and if the cloth is clean, the patch will be excused. The edges of a table-cloth wear first; these may be cut off, and the cloth used for a tray or smaller table. Cut out the best portions, and make table napkins for everyday use or for the children. When very thin, save in the linen bag for accidents.

3. Give the reasons for and against the use of a sewing-machine in a household.

Work done by a sewing-machine is strong and durable.

Much time and labour is saved by using a machine, and in a family where much clothing is required this should be a great consideration.

Much of the work is neater; as the hemming of sheets, tablecloths, napkins, &c.

Childrens dresses, boys' suits, and even the dresses of grown-up people, may be made at home with the aid of a sewing machine, and these could not possibly be done without it, as the stitching of bodice and similar seams must be strong.

Against the sewing-machine there can be very little said.

In the commencement its cost may be a disadvantage, but a hand-machine may be obtained for £3 3s. Felling, seaming, patching, &c., cannot be done by it. Anyone used to the machine is apt to become too lazy to do the parts which cannot be done by it. On the whole a sewing-machine is almost a necessity in a well-ordered household.

Section II.

(*Savings and Investments*).

4. A teacher at the age of 22 determines to put by £10 a year, and when she has arrived at 27 to increase her savings to £20 a year. Say, approximately and without calculating the amount, what annuity this would enable her to obtain for herself, after reaching the age of say 52? Supposing she did not prefer to subscribe for an annuity, what other ways are there of investing these savings, and what income would they produce?

By paying £10 per year from 22 to 52 years of age, at the latter date an annuity of £38 would be granted.

By paying a second £10 per year from 27 to 52 years of age, at the latter date an annuity of £25 would be secured.

The total annuity (approximately as requested) would be £60 per annum.

There is an infinite number of ways of investing money, but of these only a few are safe for small sums, and the rate of interest is the lower the greater the security is.

Railways, banks, and building societies may be utilised, but there is risk in all except with a few of the older railways, and not more than 3½ per cent. can be readily obtained. A really good mortgage at 4 per cent. on well-letting property is an excellent investment.

The amount actually saved would be £550, but interest received would probably bring the total to £750 or £800, from which an income of £30 or £32 might be expected.

5. A teacher in the case just described would allow herself only from £8 to £10 a year for her clothes. Describe the materials she would buy, and the economies she would practise, and give an approximate account of the details of the expenditure.

Materials.—Cashmere, beiges, merinos, and other wools for best and school dresses; these wear well, and generally will wash. Cloth for jackets, or figured material; silk not durable. Home made woollen garments. Good washing prints, or flannel for summer dresses. A good set of furs which will last many years. *Kid* gloves. Good quality feathers and flowers that they may serve more than once. Linen collars and cuffs.

Economies.—Cleaning, dyeing, turning, and re-making of dresses, Knitting of woollen garments. Making of dresses into other articles of clothing. Taking care to choose dark colours, not easily soiled. Making all underlinen. Dress-making must be done from home, for want of time. Cleaning and re-making hats and bonnets. Dyeing and cleaning feathers. Finally, if the money is found to be insufficient, to wait patiently, and wear what is there, until the money is forthcoming.

Expenditure—	£	s.	d.
One summer dress	2	0	0*
One winter dress	2	0	0*
One winter hat or bonnet	0	15	0
One summer ,, ...	0	15	0
Two pairs boots	1	1	0
Four pairs gloves	0	6	0
One jacket or mantle	1	1	0
Flannel, per year	0	5	0
Calico, per year, 1 doz., 6d.	0	6	0
Wool for knitting, 2 lbs. at 3s.	0	6	0
One umbrella	0	5	0
One petticoat	0	5	0
Waterproof, furs, &c. (instalment of) ...	0	15	0
	£10	0	0

* These dresses may be reduced, and pocket-handkerchiefs, collars, slippers, and any other item not required year by year may be bought as occasion requires.

The best dresses become second dresses. The jacket does the same, and a print dress, or extra school dress, be bought occasionally when something else can be done without.

Section III.

(*Food, its ingredients and preparation.*)

6. The food stuffs on which man subsists may be divided into two well-marked groups—Nitrogenous and Non-nitrogenous. Explain what this means, and why these terms are used.

The food stuffs have two offices to perform (A) to supply the place of waste products, and also in the growing individual to furnish material for development and (B) to maintain the heat of the system.

The first of these functions is primarily fulfilled by Nitrogenous Foods which contain certain substances called *Proteids* (from the Greek πρωτὸς = first) whose constituents are forms of *Nitrogen* in combination with carbon, hydrogen, oxygen, and a small amount of minerals.

The chief *proteids* are *albumen*, *fibrin*, *gelatin*, *gluten*. and *casein*, which may be found respectively in eggs, lean meat, calves' feet, wheat, and cheese.

Non-Nitrogenous Foods keep up the animal heat, and are almost, as their name implies, destitute of nitrogen, but replete with carbon. This class may be subdivided into *oleaginous* foods and *amyloids*. The typical instance of the former is fat, and of the latter starch or sugar.

7. What is the most economical mode of cooking meat? Give your reasons, and describe the process. The six principal methods of cooking are *stewing*, *boiling*, *roasting*, *baking*, *broiling*, and *frying*, and of these the first is the most economical.

The advantages of stewing are:—

(*a*) *Everything is utilised* by means of the stock-pot, and various scraps, otherwise of no use, furnish wholesome dishes.

(*b*) *Digestion is assisted*, as tough pieces of meat are thoroughly cooked.

(*c*) *Fuel is saved*, for the secret of good stewing is the continuous application of only *moderate* heat.

(*d*) *Labour is lessened*, for the stewpan may be left, on a proper range, neglected for hours.

(*e*) *Less skill is demanded* than for some kinds of cooking.

Get a glazed earthenware jar with a tight-fitting lid, into which pour only a small quantity of water. Cut the meat into small and well-seasoned pieces, and place it in the jar together with any vegetables except cabbage. Fit down the lid closely, and stew it for hours, subject to only moderate heat. If the jar be placed in a pan of water, and if the meat be juicy, the interior water may be omitted.

8. Give a receipt for making a boiled batter pudding, stating exact quantities, method of preparing, and time and manner of boiling.

Put two heaped tablespoonfuls of flour into a basin, drop in an egg, add a small pinch of salt, and by degrees half a pint of milk, working it into a smooth batter with a wooden spoon. The more it is worked the lighter the pudding will be. Grease a basin thoroughly, pour the batter in, grease a paper with a little dripping and place it over the top. Put the basin in a pan with boiling water which will reach about one inch *below* the rim of the basin. If the water get low in the pan, add *hot* water from the kettle or boiler, pouring it down the side of the pan, so as not to touch the top of the pudding.

Boil slowly for about 90 minutes, taking care that the pudding does not become 'watersoaked' through the water boiling up above the basin rim.

Section IV.

(Health and Sickness.)

9. What is the range of temperature for cold and hot baths respectively? What precautions are necessary in the fixing of a bath, as to filling, emptying, and overflow?

Cold baths should range in temperature from 45° to 55° Fahrenheit according to their object, and warm baths should not exceed 105°. In practice it is found that 90° is most beneficial.

A bath should be so fixed that it may readily be filled *at the foot* with either hot or cold water. One good arrangement allows these to mix previously, and to enter the bath as tepid water when required.

Every bath should be emptied by a waste pipe of larger calibre than that of the cold and hot water taps united, and this pipe should have as few bends as possible, and be provided with a syphon trap to exclude the issue of noxious gases.

It should be impossible for the bath to be so fixed that water can flow either over the top, or worse still between it and its framework. An overflow vent should be so placed that the bath can never become completely full.

10. Supposing the clothes of a girl in your school took fire, describe accurately what you would do, and what you would not do. If she had to be carried home, how would you improvise a stretcher?

The scholar should at once be enveloped tightly in the tablecloth or curtain (the thicker the material, such as green baize, the better) and rolled upon the floor. The fire is generally caught by the skirts, and when the sufferer is prostrate, it cannot spread so easily to the upper garments as when she is upright. On no account should any attempt be made to take off a garment of substantial material, nor should a rush out of doors be made. To carry the child home, get two sacks (these are generally obtainable), or big boys' jackets, and thread a wide easel through them. This will make a most comfortable stretcher.

Section V.

(Clothing and Washing.)

11. Describe as fully as you can the origin, preparation, and use of the two principal vegetable products used in this country for clothing.

Cotton, from which we produce calico, &c., and flax, from which we manufacture linen, are the products referred to.

Cotton is obtained from the downy seed-covering of the cotton-plant. When the seed becomes ripe the enclosing pod bursts, and the fluffy covering is exposed to view. This is picked off by the fingers, and then by means of the cotton-gin cleared of the seeds, and afterwards hydraulically pressed into bales ready for exportation.

When the cotton reaches the factory it is first sorted into different qualities, and has any impurities removed from it by a machine called the *willow*. It is then *lapped* or brought into the form of a compressed fleecy layer, and afterwards *carded*, so that the filaments are stretched out lengthwise. Passing through the *drawing-frame* the fibre is still further straightened and is *doubled*. The cotton has now the appearance of a loose porous cord with its fibres lying parallel. The next process is called *roving*, which is really the commencement of *spinning*, which last operation is performed by the throstle or mule-jenny.

The fibres are now ready for *weaving*, which in its most primitive state is simply darning. The long threads running from end to end of the piece are called the warp, and those cross ones interlacing from side to side are named the weft. Machines for weaving are called looms, and these have by Arkwright, Cartwright, Miller, Jacquard, Jennings, Durand, &c., been brought to a high degree of perfection.

The uses of calico (and print) are too varied to be enumerated. Calico sheets and underclothing are useful, especially those of the twilled variety. Print dresses for summer wear are clean, light, and cool; and are good throughout the year as working dresses.

Flax is grown in Belgium, Ireland, Scotland, England, and Egypt, &c., chiefly for the fibres yielded by the bark, the plant reaching from 1½ to 2 ft. in height. After the plant is gathered it is *rippled* to remove the seeds, *retted* to disconnect the fibres, and *broken* and *scutched* to discard the woody portions. The flax is next *heckled* or combed, and is now ready for *spinning*. This last operation is performed on the same lines as for cotton.

The fibre produced is called Linen, and is used for sheets and underclothing. From the varieties of linen we have *lawn* handkerchiefs, *cambric* robes, *damask* tablecloths, and *huckaback* towels.

12. Two teachers live together in the country, and have their washing-day once a fortnight. Describe how they could manage with the help of a girl of 14, remembering that their school duties must not be neglected.

The sorting and soaking must be done the evening before washing, therefore it will be well to wash on the Tuesday. 'Many hands make light work,' so that if all take a share in superintending, sorting, and soaking; this will not take long. The girl should leave tubs, washing utensils, soap, soda, &c., all ready, as also sticks and coals, in order that she may have nothing to wait for in the morning. On the washing day the girl should not be required to leave her work. It will be necessary for her to rise early, light the fire, fill the boiler, and commence as soon as the water is warm. One of the teachers will probably see to breakfast, make beds, and prepare for dinner, while the other will put things in going order in the the wash-house. Collars and cuffs, laces, starching, &c., cannot as a rule be left to a girl so young. At dinner-time assistance will be given to the girl by putting out and taking in clothes, or, if raining, drying at the fire. In the evening the work of folding, starching, and sprinkling will no doubt be shared, and on the following evening things that the girl cannot be trusted with will be ironed and all put away.

The easiest methods of washing should be adopted, and a washing machine is a necessity, as so much labour and time may be saved.

(To be continued.)

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THE 1892 SCHOLARSHIP EXAMINATION.

BY DR. GEORGE BEACH, M.A.

Co-Author of 'A Manual of our Mother Tongue,' 'A Girls' Arithmetic,' Author of 'Elements of English,' 'Entertaining Readers,' etc.

1. The Scholarship Examination of 1891 is now a thing of the past, and we are but ten months from its successor. As we prophesied, it was conducted in a somewhat different and greatly improved manner. Instead of the system so long in vogue of requiring the answer to be given on the same paper as, and alongside of the questions, the latter were printed on separate sheets, whilst an answer book containing six pages of excellent paper, foolscap size, was furnished for each subject.

Only one side of each sheet was to be written upon, the other being used as 'scribbling paper' for elementary processes and rough drafts of answer.

No bona fide complaints of the questions have reached us, and the allowance of paper was deemed by the candidates sufficient, except for the Mathematics of the men candidates.

These latter would, however, have gained much space by doubling the paper lengthwise for the Euclid, a practice which we recommend to be adopted throughout the whole course of preparation.

2. Copious comment on the questions is unnecessary in view of the fact that model answers to every one of them will appear in this magazine, and that they were exactly of the kind propounded weekly in our articles. In the Geography paper more than one question was, without controversy, taken almost verbatim from Gregory's Physiography, published by Hughes and Co.

Examples.

Government Question.	*Gregory's Physical and Astronomical Geography.*
1. Why does the Ganges rise from May till September?	1. The Ganges rises from May till September, owing to the melting of snow, &c., p. 194.
2. Why does the Rhone enter the Lake of Geneva as a swift and turbid stream, and leave it clear and transparent?	2. The river Rhone enters the Lake of Geneva as a swift and turbid stream, and leaves it clear and transparent, having deposited at the upper end of the lake soil brought from the Alpine slopes, &c., p. 199.

Similarly also it will be found that questions 7, 8, 9, in the English Paper are fully answered in Dr. Beach's 'Elements of English, and Questions I. (3), 4 and 6 were predicted in our Scholarship articles.

In Arithmetic 'Dixon and Beach's Arithmetic' most minutely met every requirement, as is particularly exemplified by Question 1, both in the men's and women's papers.

We trust, therefore, that our readers will see that we are guiding them safely in the matter of the recommended Text-Books. There is also another inexpensive one, just in the groove, that should be procured, viz, 'Hughes's Scholarship Copy Book,' price 1s. The ruling is a facsimile of that adopted by the Education Department, the copies set are of examination length, there are sets of letters arranged in order of elementary formation, and also of difficulty, in addition to many other valuable features.

3. It will be noticed that no less than three portions of the *Practical Teacher* are set aside for Scholarship candidates: (A) The present article; (B) Professor Darque's edition of 'La Jeune Siberienne,' and (C) Model Answers to the 1891 Questions.

4. Again we urge that candidates will secure the *extra marks* for (A) Science, (B) Drawing, (C) Language, and (D) Music. Without these it is next to impossible to attain a good position on the list.

5. All candidates intending to enter a training college, whether day or residential, should at once make application, as the accommodation will be very limited in proportion to the demands made upon it. We have been asked, what colleges we would recommend; and we unhesitatingly reply 'those upon which the candidates have any claims,' as thereby they obtain a better chance of being admitted, if they be comparatively unfortunate at the examination.

For really advanced and able students we agree that a metropolitan residential college, or a provincial day college in connection with a university, is the best; for the object of every candidate should be not only to obtain the Government diploma, but academical distinction in addition.

6. HINTS ABOUT THE SEPTEMBER ROUTINE:

History.—Note the Progress of the Constitution, the origin of National Debt and of the Cabinet, the various treaties, the development of our colonies and dependencies, and the progress of commerce and naval supremacy, besides ordinary matter.

Algebra.—Get a clear idea of algebraic *versus* decimal notation, and familiarity with ordinary factors. Not nearly enough attention is generally devoted to the latter.

Language.—Study Professor Darque's Course and article.

Euclid.—If the propositions are already well known, devote the time to rapid revision and reproduction, not neglecting deductions. When Book I. is well known, it can be revised in an hour, and Book II. in 20 minutes. Euclid II., 8 may be altogether discarded.

Geography.—Get as much information as possible about the last census, and don't omit such portions as the government, social, political, and commercial conditions of the countries. The maps at present need not be elaborate.

Arithmetic.—In cube and square roots note the fractional examples, and especially those containing repeating decimals.

In discount, remember the two primary facts, that (1) The sum of the present worth and discount = the principal.

(2) The interest of present worth = the discount.

In stocks, learn to explain the ordinary newspaper reports about ''Change.'

English.—pp. 165, 166, 167 of '*Elements of English*' should be well mastered.

In the table of English Literature, the names in ordinary type may be at present omitted.

The student is recommended this month to read a few of Bacon's Essays.

See also remarks on Analysis and Parsing in Certificate Article.

French or *Latin.*—See that the accidence is thoroughly fixed in the memory. Re-translate back into *Latin* or *French* any *Latin* or *French* previously rendered into English. Keep a little note-book in which to enter any little idiomatic phrases met with in the foreign author. For Latin, Dr. Abbott's 'Latin Prose through English Idiom' is an admirable work, and vastly more serviceable than many larger books on more conventional lines.

School Management.—Commence to examine thoroughly how far your usual practices in school are in accordance with the best theory, and if not how can you best conform the practical to the ideal. Request the head teacher to explain any difficulties. The Scholarship Candidate should be old enough and sufficiently experienced 'to know what he is ignorant of.'

Music.—It is not too early to commence practising 'ear-tests.'

Science and Drawing.—By no means wait until the classes of the winter session commence, but fix upon the subjects to be taken, and devote the period given in the Routine to their study.

SCHOLARSHIP OR FOURTH YEAR ROUTINE FOR **SEPTEMBER, 1891.** (MEN AND WOMEN.)

DAYS	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Algebra up to Factors. Questions on Needlework	History from 1760 to 1773	Language	H.C.F. of Algebra. Ingredients of Food	Dates from 1760 to 1787	Language	Algebraic Fractions. Rules of Health	History from 1787 to 1807	Language	Simple Equations Miscellaneous Geography	Dates from 1787 to 1819	Language
TUESDAY	Props. 12 and 13 of Euclid, Book II. Diagram of Night Shirt	Physical Geography of South America.	Science	Props. 14, 1 and 2 of Euclid, Book II. Flannel Sampler	Revise Geography of Scotland	Science	Props. 3 and 4 of Euclid, Book II. Calico Sampler	Political Geography of South America	Science	Props. 5, 6, and 7, of Euclid, Book II. Diagram of Night Shirt	Revise Geography of Ireland	Science
WEDNESDAY	Percentages	History of English Language	Drawing	Stocks	Paraphrasing and Repetition	Drawing	Square Root	Table of English Literature	Drawing	Exchange	Latin Prefixes and Affixes	Drawing
THURSDAY	H.C.F. (G.C.M) of Algebra. Savings and Investments	History from 1773 to 1787	Language	G.C.M. of Algebra. Preparation of Food	England under the Normans	Language	Algebraic Fractions. Clothing and Washing	History from 1807 to 1819	Language	Simple Equations. Miscellaneous Geography	England under the Plantagenets	Language
FRIDAY	Revise Props. 32 to 48 of Euclid, Book I. Calico Sampler	Physical Geography of South America	Science	Deductions on Euclid, Book II. Diagram of Night Shirt	Map of Australia	Science	Revise Props. 1 to 16 of Euclid, Book I. Flannel Sampler	Political Geography of South America	Science	Deductions on Euclid, Book II. Any Needlework	The Seasons	Science
SATURDAY	Stocks	Parsing and Analysis / How to teach Grammar to Standard V.	Repetition and Literature	Mensuration of the Circle. Mixtures	Study English Accidence from Text Book	Notes of a Lesson on Geography of Stan. VI. / Any Revision	Equation of Payments	Parsing and Analysis	Music / Any Geography	Mensuration of Triangles. Square Root	Paraphrasing and Dictation	Latin Roots / Repetition and Literature

SELECTED GOVERNMENT QUESTIONS.

WEEK ENDING 5TH SEPTEMBER, 1891.

1. Analyse the following passage, and parse the italicised words:—

'Yet *live* there *still* who *can remember* well
How when a mountain-chief his *bugle* blew,
Both field and forest, dingle, *cliff* and dell,
And solitary heath the *signal* knew.'

2. Write a letter on one of the following subjects:—*Gardening*, or *A Storm at Sea*.

3. Draw a map of the mountain and river system of the United States.

4. Give the full meaning of the terms *tropic*, *meridian*, *longitude*, *solstice*, *coral reefs*, with appropriate diagrams in each case.

5. Write full notes of a lesson on '*The square and its properties*,' or '*The rule of three by the method of unity*.'

6. What is meant by good discipline? What are the means and ways of improving discipline?

7. What important consequences followed upon the battles of the Nile and Quebec? Name some of the chief differences between the weapons of war employed in these battles and in modern warfare.

8. Give an account of the conquest of Britain by the Romans. Name any distinguished Romans who died in this country.

9. Write the scale of A minor.

(*For Sol-faists.*) Name (*a*) the strong tones and (*b*) the leading tones of the common major scale.

10. Give rules for working mentally the following problems, and illustrate each by an example—

(*a*) To find the price of a score.
(*b*) To multiply by 99.
(*c*) To multiply by $2\frac{1}{2}$.
(*d*) To find the interest at 5 per cent. for a month.

11. A corn factor bought 160 quarters of wheat at 41s. 3d. per quarter, and sold it at 58s. 4d. What did he gain, and at what price ought it to have been sold to gain £33?

£136 13s. 4d.; £2 5s. 4½d. Ans.

12. (*Men only.*) Any two sides of a triangle are together greater than the third side.

If a straight line be drawn from the vertex of a triangle bisecting the base, the line together with half the base is greater than half the sum of the two sides.

(*Women only.*) Cut out, and tack together, a paper pattern of a full sized night-shirt sleeve for a boy of 8 years of age.

13. (*Men only.*) A triangular space whose sides are in the ratio of 5 : 5 : 6 contains 588 square yards. Find the length of its sides.

35, 35, 42 yards. Ans.

(*Women only.*) Describe the amount of savings that unmarried school teachers (male *or* female) could make per annum out of a salary of £80 a year, and the best modes of investing their money.

14. (*Men only.*) What is the condition that $x^2 + px + q$ may be divided by $x - r$?

$$r = \frac{-p \pm \sqrt{p^2 - 4q}}{2}$$ Ans.

(*Women only.*) Mention the different kinds of animal food in common use in England, and state the position which each holds as regards nutrition and ease of digestion. Give your reasons.

WEEK ENDING 12TH SEPTEMBER, 1891.

1. Point out the historical order in which the several foreign elements were incorporated into the English language. During what period did English seem to be dying out, and under what circumstances and influences did it revive?

2. Give your definition of an adverb, a preposition, and a conjunction, and show by examples the difference between each of them and the other two. Can you mention any words belonging to these three classes which cannot be parsed without knowing their position in a sentence?

3. Describe the population of the United States, with reference to race and occupation.

4. Enumerate the chief productions of Trinidad, Victoria, and Ceylon. Give the dates of the acquisition of these possessions.

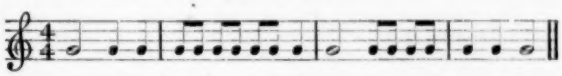
5. Describe exactly what is expected of a scholar at the examination of the Fourth Standard in Reading, Writing, Arithmetic, English, and Geography.

6. What is the proper height and size of desks (*a*) for an infant school, and (*b*) for a school of older children. Say how desks ought to be placed in reference to the light.

7. Name the sovereigns of the House of Brunswick, with the dates of their accession. Trace their descent from the last reigning dynasty, and state on what their right to the throne is founded.

8. Explain the term '*the making of England*,' and give a brief account of the kingdoms of Northumbria and Wessex.

9. *Time test*—(to be sung to a friend).



(*For Sol-faists.*)

| 1 :— | 1 :1 | 1.1:1.1 | 1.1 :1 | 1 :— | 1.1 :1.1 | 1 :1 | 1 :— ‖

10. How much must be invested in the Three per Cents. at 99 to produce the same income as would be obtained by investing £1,508 in the Two-and-a-Half per Cents. at 87? (Neglect brokerage.)

£1,430. Ans.

11. Find the exact compound interest on £3,976 for two years at 4 per cent.

£324 8s. 9·984d. Ans.

12. (*Men only.*) Triangles on equal bases and between the same parallels are equal to one another.

If the perpendiculars drawn from the vertices to the bases of two triangles be equal, the bases being equal and in the same straight line, the triangles are equal.

(*Women only.*) Explain how you would put on a patch 2 inches square in (*a*) a table cloth, (*b*) a flannel petticoat.

13. (*Men only.*) Why cannot we satisfactorily demonstrate propositions of the second book by algebraic processes?

In every triangle the square on the side subtending an acute angle is less than the squares on the sides containing that angle by twice the rectangle contained by either of these sides, and the straight line intercepted between the perpendicular let fall on it from the opposite angle and the acute angle.

(*Women only.*) State fully what are the objections to a diet either exclusively vegetable or exclusively animal.

14. (*Men only.*) The three sides of a triangle are in the ratio 4 : 5 : 7 and their sum equals 32 yards. Find the area of the triangle in yards to two places of decimals.

39·19 yards. Ans.

(*Women only.*) What would you do before the doctor came if a child in your school were (*a*) badly scalded, (*b*) had fainted, (*c*) had cut his arm above the elbow?

15. (*Men only.*) Prove that the difference between the cube of the sum of any two numbers and the sum of their cubes is divisible by three times their product.

WEEK ENDING 19TH SEPTEMBER, 1891.

1. Paraphrase the following passage:—

'Breathes there the man with soul so dead
Who never to himself hath said,
"This is my own, my native land!"
Whose heart hath ne'er within him burned
As home his footsteps he has turned
From wandering on a foreign strand?
If such there be, go mark him well
For him no minstrel raptures swell.'

2. Take each of the following words, and add to it a prefix or a suffix. Explain, in each case, what change in the meaning of the word has been effected by the additional syllable :—

Just	*Admire*	*Faith*	*Pure*	*Brother*
Friend	*Sincere*	*Wise*	*Hard*	*Speak*

3. Draw a map of Scotland, marking in the principal cities and denoting the occupations of the various districts.

4. Explain, and illustrate by a diagram, the variation in the length of day and night.

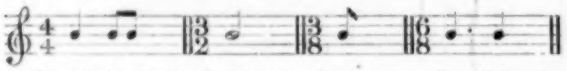
5. Write the words '*Geographical Analysis*' in largehand, and give rules for the lengths of the letters *p*, *h*, *l*, *y*.

6. Detail the apparatus required for lessons on a *Coal Mine*, and draw suggestive diagrams.

7. Sketch briefly the career of the great Duke of Wellington.

8. Say who was reigning at the beginning of each of the ten centuries, from the tenth to the *nine*teenth inclusive, and give in each case the date of the sovereign's accession and death.

9. Complete each of the following bars by adding *one* note :—



(*For Tonic Sol-faists.*) Describe the measures formed by the following accents :—

10. Show how you would demonstrate to an upper class that in any proportion the product of the extreme terms *must always* equal the product of the means. Give an illustrative example.

11. A man left his eldest son half his property, to each of the two other sons $\frac{1}{8}$ of the remainder, and the rest, amounting to £1,000, in smaller legacies. How much did he leave altogether?

£12,000. Ans.

12. (*Men only.*) In any right-angled triangle, the square which is described on the side subtending the right angle is equal to the squares described on the sides which contain the right angle.

From the middle point of a side of a right angled triangle a perpendicular is drawn to the hypotenuse. Show that the difference of the squares on the segments into which it is divided is equal to the square on the other side.

(*Women only.*) Describe fully the following stitches, and say in what garments and materials they are commonly used, and how you would teach them to children :—*hemming, felling, back-stitching*, and *feather-stitching*.

13. (*Men only.*) If a straight line be divided into any two parts, the rectangles contained by the whole and each of the parts are together equal to the square on the whole line. State this also algebraically.

(*Women only.*) Name the more common and economical vegetables, and state how each may be cooked to the best advantage.

14. (*Men only.*) Find the G.C.M. of $x^3 - 3x^2 - 13x + 15$ and $x^3 + 9x^2 + 11x - 21$. $x^2 + 2x - 3$. Ans.

(*Women only.*) Which are the principal cereals and what are their ingredients. What do you know of the nature and properties of sago, tapioca, and arrowroot?

15. (*Men only.*) The longer diagonal of a rhombus is 1,014 feet, the length of a side is 845 feet. Find the area of the rhombus and the length of the shorter diagonal. 685,464 sq. ft., 1,352 ft. Ans.

WEEK ENDING 26TH SEPTEMBER, 1891.

1. In what different ways may the Infinitive Mood be used. Give examples.

2. Write notes of a first lesson on the analysis of a simple sentence.

3. Give the provinces of Australia, with their chief towns, population, industries, and area.

4. Describe the situation of Glasgow, Limerick, Belfast, Swansea, Yarmouth, Dundee, and Newcastle. State the industries specially associated with each of them.

5. Make and explain diagrams to illustrate the following :—(*a*) $\frac{1}{2}(\frac{1}{3} - \frac{1}{4}) = \frac{1}{24}$ (*b*) $(\frac{1}{3} - \frac{1}{4}) \div \frac{1}{2} = \frac{1}{6}$.

6. Show how a map differs from a plan and from a picture. Explain how you would supply its deficiencies to a class beginning to learn geography.

7. When were the legislative unions of Scotland and of Ireland with England effected? What circumstances led to these unions and how were they accomplished?

8. Recount, in order of time, the principal quarrels between the Church and Crown before the time of Henry VIII., stating clearly but briefly the points in dispute in each case.

9. Explain the following terms :—*Rallentando, Vivace, Crescendo, Andante.*

10. Find the present worth of £1,756 16s. 0¾d. due 4 months hence at 4½ per cent. per annum. £1,738 6s. 8d. Ans.

11. A rectangle 363 feet long covers ·0003125 of a square mile. How wide is it? 24 feet. Ans.

12. (*Men only*). To bisect a given rectilineal angle.

The three lines which bisect the angles of an equilateral triangle meet in a point.

(*Women only*). Describe fully the different stages of instruction by which a child would advance from her first lesson in knitting to making a stocking for a full grown man.

13. (*Men only*). To describe a square that shall be equal to a given rectilineal figure.

To divide a given straight line into two parts so that the rectangle contained by the two parts shall be equal to the square on one fourth of the given line.

(*Women only*). Shew how an artisan's wife with a family of four children may contrive to save money by careful economy in small details.

14. (*Men only*). Solve the equation $2x + \sqrt{x^2 + 7x + 23} - 25 = 0$. $x = \frac{56}{3}$ or 7. Ans.

In the quadratic equation $x^2 + ax + b = 0$; show that $-a =$ the sum of the roots.

(*Women only*). Give a simple recipe for making (*a*) mutton broth, (*b*) pea soup, (*c*) rice pudding, (*d*) oatmeal porridge, (*e*) bread.

15. (*Men only*). Find the length of the sides of a parallelogram, one angle being half a right angle, the altitude being equal to half the base, and the area containing 1,250 square feet.

50 and $25\sqrt{2}$. Ans.

ERRATA.

Week ending 8th August, question 9, read 289 *acres*; question 13, read 450 *links* instead of 490, and 120 *links* instead of 100.

A capital book of 282 pages, entitled 'Training Colleges for Schoolmistresses' has just been published by Howarth Barnes at the price of 3s. 6d. Unlike most books of the kind it is pleasant reading, and it should be in every Girls' School Library, and in every Pupil Teacher's hands.

CORRESPONDENCE.

See end of Certificate article. Any candidate requesting reasonable information will meet with a prompt and favourable response.

(To be continued.)

SCIENCE NOTES.

THE THEATROPHONE.—Our French neighbours have now on the tapis the transmission of everything audible which occurs on the stages of the Paris theatres. The promoters of the theatrophone, a clever adaptation of the ordinary telephone, have already received leave for its admission at the Théâtre Français, the Opera Comique, the Bouffes, and the Nouveautés, and almost all the Paris theatres seem likely to follow in their wake. The installation is arranged in two ways. Communication with the theatre is uninterrupted in private houses. In the hotels, restaurants, and cafés, it is dependent on the insertion into the instrument of either a fifty centime piece or a franc, on the 'penny in the slot' plan. The tube communi-

cating the auditory impulse is attached to a small square box, into which the coin is dropped. Its weight opens a valve by which communication is established. This remains open either for five or ten minutes, according to the denomination of the coin. Then the latter falls into a receptacle, the plate rises, and communication is cut off. By the successive insertions of coins, either the whole or part of the play can be heard. The newest development of the idea of the theatrophone is the project of a spoken daily paper late at night, which will carry to the clubs, hotels, and newspaper offices all the latest news at home and abroad.

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PURE WATER SUPPLY FOR LONDON.—With the extension of the sewerage system necessitated by the constantly increasing population of London any reasonable scheme for supplying the metropolis with pure spring water is worthy of consideration. The valley of the Colne has lately been the scene of some important experiments towards this end. A number of wells have been sunk and trial borings made in the neighbourhood of Rickmansworth. A reservoir capable of holding five million gallons has been constructed, and provision has been made for laying mains up to London. With regard to the extent of the water supply available from this source, it seems from practical pumping tests, made under the supervision of Mr. Claud Monckton, the originator of the scheme, that the present available amount of water amounts to no less than ten million gallons in the course of twenty-four hours. By a further sinking it is estimated that the supply could be increased twofold. Dr. Frankland, to whom the water thus obtained from the chalk has been submitted for analysis, reports that its quality is excellent. The Waterworks Company to which this water has been offered does not, unfortunately, possess the necessary statutory powers to enable them to avail themselves of this new source of supply, and hence for the present they have been compelled to decline to take it over. In view of the importance of the general question this difficulty will no doubt be got over in due time. It is interesting to note in this connection that the clearness of spring water does not ensure its purity. As Major Powell, of the U.S. Geological Survey, has recently shown, of all the substances which when added in small quantities cause precipitation of the finely divided clay found in water supplied to cities, the one which produces the result by the most minute addition is sewage. It follows therefore that too clear water must be regarded with suspicion, and that very careful examination as to organic constituents is necessary before adoption of such supply.

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A RIVAL TO THE JUTE.—The ramie plant, or china grass, is rapidly coming into commercial importance as a rival to the jute, so largely used in the manufacture of carpets and certain kinds of cloth. Three species of this plant, *Bohmeria nivea*, *B. tenacissima*, and *B. caudicans*, perennials, and natives of the warmer temperate part of Eastern Asia, were introduced into the Southern States of America as early as the year 1862. The plants are closely allied to the true nettles, but differ from them in not being furnished with stinging hairs. *B. nivea* is a small shrubby plant growing to a height of about four feet, throwing up numerous straight shoots which are about as thick as the little finger. The leaves are of a deep green colour on the upper side, but are covered on the under side with a dense coating of white down, which gives them the appearance of being covered with frosted silver. The grass cloth prepared from this shrub rivals the finest French cambric in softness and fineness of texture. It yields three crops annually, the inner bark of young quickly-grown stems affording the beautifully fine delicate fibre from which the best fabrics are manufactured. This fibre possesses nearly double the tenacity of Russian hemp. The plants grow with the greatest facility, and are very easily propagated, yielding large crops. Now several large companies have been incorporated under the patents of the inventors of machines capable of performing the decortication of the fibre at a cost low enough to compete with the cheap manual labour of the East, and a new crop has practically been added to the old staples. In connection with this development, which promises to be very profitable, it is very important to notice a new discovery, which is that ramie fibre after being subjected to strong hydraulic pressure possesses a tensile power greater than that of steel, and that it can be used with advantage in the production of steam-pipes.

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DIASTATIC ENZYME IN PLANTS.—In a recent number of the *Botanische Zeitung* Professor Wortmann attacks the current view that there is invariably present in plants a diastatic ferment which is essential to the decomposition of starch. To demonstrate the presence of diastase, he recommends that part of the plant under examination be extracted with an equal volume of cold water after being thoroughly crushed. Except when large quantities of starch, mucilage, or albumenoids are present, the extraction should not last for more than from two to three hours. The presence of diastase in the extract is then shown by its action on starch, which it readily converts into grape sugar. From the large number of experiments he has made for this purpose, Dr. Wortmann is of opinion that in reserve receptacles, where large quantities of starch are stored up, such as seeds, tubers, and rhizomes, diastase is also present in considerable quantities, while on the other hand it is not found in assimilating leaves, where also much starch is present. He maintains, moreover, not only that starch can be utilised without the assistance of diastase, but that the latter occurs where it can have no physiological function in connection with the absorption of starch.

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THE STRUCTURE OF PROTOPTERUS.—Professor W. N. Parker has lately published the results of an investigation into the anatomy of the protopterus, which possesses considerable interest to the naturalist. He is of opinion that the mud-fish and its kin are 'the isolated survivors of an exceedingly ancient group, which was probably related to the ancestors of existing fishes and amphibians.' The mud-fishes possess marked differences in structure from the rest of the fishes. Their heart has three chambers, and though they possess gills, their air-bladder is made double and converted into lungs. They are truly amphibious, breathing air directly from the atmosphere by their lungs, and using the oxygen contained in the water by their gills. In their habitat—the waters of the Gambia and the Amazon—they swim about in the pools and rivers during the wet season, and, at its close, they burrow down into the soft mud, where they lie throughout the dry season in a torpid condition. When the fish has passed into its mud cocoon, the lid of which is perforated by a tube or funnel, this funnel passes directly to its mouth, thus conveying air to the lungs. During its torpid summer sleep the nourishment of the protopterus seems to depend on a store of fatty material which is deposited along the spinal region of the fish. This fatty material seems to be absorbed with the blood. Professor Parker suggests further, that certain of the tail muscles may undergo a process of fatty degeneration, thus assisting in the nourishment of the dormant protopterus.

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DAIRY SCHOOLS IN AUSTRALIA.—The action of the University College of North Wales at Bangor, in instituting practical dairy courses for its Agricultural students, and that of the Bath Agricultural Society resulting in the foundation of peripatetic butter schools and summer cheese schools, have recently excited the attention of the Government of New South Wales. Since that Colony exports butter to England, its Minister of Mines and Agriculture is advocating the establishment of a travelling dairy to impart instruction to the settlers in relation to this industry. Meanwhile the Technical Education Committee of the Kent County Council is setting other counties an excellent example by placing £3,000 at the disposal of the South Eastern Counties Association for the extension of University Teaching for the delivery of courses of lectures suited to agricultural and rural populations in small towns and villages throughout the country. This is following in the footsteps of the County Council of Devonshire, who led the way during last spring by holding such courses in twelve centres in that county.

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ALDININI PRIZE.—The Accademia delle Scienze dell' Instituto di Bologna offers a gold medal of the value of 1,000 lire (about £40), the Aldinini Prize, 'to the author of a memoir which, based on accurate data of chemistry, or physics, or applied mechanics, shall indicate new and really practical systems or new apparatus for the prevention or extinction of fires.' The memoirs may be either manuscript, or printed matter published between May 11th, 1890, and May 10th, 1892. In the former case, the memoirs must be written in Italian, Latin, or French; in the latter, they may be in any language, but if not in Italian, an Italian translation must be added. They must be sent in on or before May 10th, 1892.

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AN OBSERVATORY ON MONT BLANC.—For a considerable time M. Janssen has been endeavouring to raise funds for the erection of an observatory on Mont Blanc. Now Baron Alfred de Rothschild and M. Eiffel have taken up the idea, and it is probable that the course of a few months will see this crown to the Monarch of the Alps.

LA JEUNE SIBÉRIENNE.

TRANSLATED BY PROFESSOR DARQUÉ.

(*Author of 'Pupil-Teachers' French Course.'*)

La Jeune Sibérienne.

Jusqu'alors l'espérance de la liberté n'était point entrée dans[47] son cœur. Ce sentiment nouveau pour elle la remplit[48] d'une grande joie ; elle se remit aussitôt en prière ; mais ses idées étaient si confuses, que, ne sachant elle-même ce qu'elle voulait demander à Dieu, elle le pria seulement de ne pas[49] la priver du bonheur qu'elle éprouvait et qu'elle ne savait[50] définir. Bientôt, cependant, le projet d'aller à Saint-Pétersbourg se jeter aux pieds de l'empereur et lui demander la grâce de son père se développa dans son esprit et l'occupa désormais uniquement.

Elle avait choisi, dans la lisière[51] d'un bois de bouleaux qui se trouvait près de la maison, une place favorite où elle se retirait souvent pour faire[52] ses prières ; elle fut plus exacte encore à s'y rendre[53] dans la suite. Là, tout entière à son projet, elle venait[54] prier Dieu, avec toute la ferveur de sa jeune âme, de favoriser son voyage et de lui donner la force et les moyens de l'exécuter. S'abandonnant à cette idée, elle s'oubliait souvent dans le bois, au point de[55] négliger ses occupations ordinaires, ce[56] qui lui attirait des reproches de ses parents. Elle fut longtemps avant d'oser s'ouvrir à eux[57] au sujet de l'entreprise qu'elle méditait. Son courage l'abandonnait chaque fois qu'elle approchait de son père pour commencer cette explication hasardeuse, dont elle prévoyait confusément le peu de succès.[58] Cependant, lorsqu'elle crut[59] avoir suffisamment mûri son projet, elle détermina le jour où elle parlerait, et se proposa fermement de vaincre sa timidité.

A l'époque fixée, Prascovie se rendit de bonne heure[60] au bois, pour demander à Dieu le courage de s'exprimer et l'éloquence nécessaire pour persuader ses parents : elle revint ensuite à la maison, résolue de parler au premier[61] des deux qu'elle rencontrerait. Elle désirait que le hasard lui fît trouver sa mère, dont elle espérait plus de condescendance ; mais, en approchant de la maison, elle vit son père assis sur un banc près de la porte et fumant une pipe. Elle vint à[62] lui courageusement, commença l'explication de son projet, et demanda, avec toute la chaleur dont elle fut capable, la permission de partir pour Saint-Pétersbourg. [63]Lorsqu'elle eut terminé son discours, son père, qui l'avait écoutée sans l'interrompre et du plus grand sérieux,[64] la prit par la main, et rentrant avec elle dans la chambre où la mère apprêtait le dîner : 'Ma femme, s'écria-t-il, bonnes nouvelles ! nous avons trouvé un puissant protecteur ! Voilà notre fille qui va partir sur l'heure[65] pour Saint-Péters-

The Young Siberian.

Until then the hope of liberty had not entered her heart. That feeling, new to her, filled her with (a great) joy ; she immediately began to pray again ; but her ideas were so confused that, not knowing herself what she wanted to ask of God, she begged Him only not to deprive her of the happiness she experienced and which she could not define. Soon, however, the project of going to St. Petersburg to throw herself at the feet of the emperor and ask of him the free pardon of her father, developed itself in her mind and henceforth entirely occupied it.

She had chosen, in the skirts of a wood of birch trees which was near her home, a favourite spot to which she often repaired to say her prayers ; she was more exact still in going there afterwards. There, entirely occupied by her project, she used to come and pray to God, with all the fervour of her young soul, that He should favour her journey, and grant her the strength and means to carry it out. Yielding herself to that idea, she often forgot herself in the wood, so far as to neglect her usual occupations, which brought upon her reproaches from her parents. It took her a long time before she dared to unbosom herself to them on the subject of the enterprise she was meditating. Her courage forsook her every time she approached her father to begin that bold explanation, the doubtful success of which she dimly foresaw. However, when she thought she had sufficiently matured her project, she decided on the day when she would speak, and firmly resolved to overcome her timidity.

On the appointed day Prascovie went early to the wood to ask of God the courage to speak, and the eloquence necessary to persuade her parents ; she afterwards returned home, resolved to speak to the first of the two she should meet. She wished that chance should make her meet her mother, from whom she expected more compliance; but when she came near the house she saw her father seated on a bench near the door and smoking his pipe. She came to him courageously, began the explanation of her project, and asked, with all the earnestness of which she was capable, the permission to start for St. Petersburg. When she had ended her speech, her father, who had listened to her without interrupting her and with his most serious look, took her by the hand, and going with her into the room where her mother was getting dinner ready: 'Wife,' he exclaimed, 'good news ! we have found a powerful protector! There is our daughter who is going to start at

Notes.

(47)Many French verbs require prepositions after them, although the corresponding English verbs do not.

(48)Notice the expressions (a) *remplir de*, to fill with ; (b) *plein de*, full of.

(49)Euphony alone decides whether *pas* is to be placed before the infinitive or after it, though both places are grammatically correct.

(50)*Ne savait* could also be rendered by 'knew not how to.'

(51)The proper meaning of *lisière* is 'list' —of cloth ; hence the familiar expression *mener à la lisière*, to keep in leading-strings.

(52)*Faire* is unquestionably the most difficult word in the language, owing to the great number of gallicisms (French idioms) in which it appears.

(53)*Se rendre*, followed by the name of a place, is translated by 'to go' ; but, in reference to fighting men, by 'to surrender.'

(54)Notice the expressions : *allez jouer*, go and play ; *venez me voir*, come and see me.

(55)*Au point de* may also be rendered by 'to such a degree (an extent) as to.'

(56)The antecedent of a relative pronoun is always expressed by a single word ; here the whole of the previous clause is the real antecedent ; hence the insertion of *ce*, with which *qui* agrees.

(57)*S'ouvrir* is another of the few verbs which require *à* before their indirect object, even if it be a personal pronoun used in reference to persons.

(58)No noun used as direct object of a verb can precede the word by which it is governed.

(59)The infinitive is preferred to any other mood whenever its use can cause no ambiguity.

(60)Notice the expressions *à la bonne heure*, well and good ; *il est venu tout à l'heure*, he came just now ; *il viendra tout à l'heure*, he will come by-and-by.

(61)*Le premier* is used in reference to two or any greater number. There is likewise but one mode of expression for the superlative, whatever be the number of persons or things alluded to : *le plus grand des deux*, the greater of the two ; *le plus grand de tous*, the greatest of all.

(62)The preposition *à* must be expressed before personal pronouns objects if they refer to persons and are governed by any of the following verbs :—

aller,	to go	*tenir*,	to be fond
courir,	to run	*venir*,	to come
accourir,	to hasten	*revenir*,	to come back
être,	to belong	*viser*,	to aim
penser / *songer*	to think	*prendre garde*	to beware
			etc.

(63)*Lorsque* and *quand* have identically the same meaning, only the former is never used at the beginning of a question : *quand viendrez-vous ?* when will you come ?

(64)*Du plus grand sérieux* may be rendered by 'with the utmost seriousness' Adjectives are more often used as nouns in French than in English.

(65)*Sur l'heure*, immediately. Literally, 'upon the hour.'

bourg, et qui veut bien[66] se charger de parler elle-même à l'empereur.' Lopouloff raconta plaisamment ensuite tout ce que lui avait dit Prascovie. 'Elle ferait mieux, répondit la mère,[67] d'être à son ouvrage que de[68] venir vous conter ces balivernes.' La jeune fille s'était armée d'avance contre la colère de ses parents, mais elle n'eut point de force contre le persiflage, qui semblait anéantir toutes ses espérances. Elle se mit à[69] pleurer amèrement. Son père, qu'un instant de gaieté avait fait sortir de son caractère, reprit bientôt toute sa sévérité. Tandis[70] qu'il la grondait au sujet de ses larmes, sa mère, attendrie,[71] l'embrassait en riant. 'Allons, lui dit-elle en lui présentant un linge,[72] commence par nettoyer la table pour le dîner; tu pourras ensuite partir pour Saint-Pétersbourg, à ta commodité.

Cette scène était plus faite pour dégoûter Prascovie de ses projets que des reproches ou de[73] mauvais traitements; cependant l'humiliation qu'elle éprouvait de se voir traiter[74] comme un enfant se dissipa bientôt et ne la découragea point. La glace était rompue; elle revint à la charge à plusieurs reprises, et ses prières furent bientôt si fréquentes et si[75] importunes que son père, perdant patience, la gronda sérieusement, et lui défendit avec sévérité de lui parler là-dessus davantage.[76] Sa mère, avec plus de douceur, tâcha[77] de lui faire comprendre qu'elle était trop jeune encore pour songer[78] à une entreprise si difficile.

once for St. Petersburg, and who kindly undertakes to speak herself to the emperor.' Afterwards Lopouloff humorously related everything that Prascovie had told him. 'She would do better,' the mother answered, 'to be at her work than to come and tell you such nonsense.' The young girl was prepared for the anger of her parents, but she was powerless against raillery, which seemed to annihilate all her hopes. She began to cry bitterly. Her father, whom a moment of gaiety had caused to forget his character, soon resumed all his sternness. While he was scolding her on account of her tears, her mother, *who was* moved, embraced her laughing. 'Come,' she said to her, while handing her a duster, 'begin with cleaning the table for dinner; you can afterwards start for St. Petersburg, at your convenience.

That scene was more calculated to dishearten Prascovie about her projects than reproaches or ill treatment; yet the humiliation she experienced at seeing herself treated as a child soon vanished and did not dishearten her. The ice was broken; she made several new attempts, and her entreaties soon became so frequent and so troublesome that her father, losing patience, scolded her seriously, and severely forbade her to speak to him any more on the subject. Her mother, with more gentleness, endeavoured to make her understand that she was still too young to think of so difficult an undertaking.

(To be continued.)

(66) When *bien* modifies the verb *vouloir* it is best rendered by 'kindly'; however, the imperative *veuillez*, without *bien*, expresses the same idea as *veuillez bien*.

(67) When a verb shows that the remainder of the sentence is a quotation, its subject invariably follows it in French.

(68) 'Than,' after a comparative, is translated by *que de* when the second term of the comparison begins with an infinitive.

(69) *Se mettre à l'ouvrage*, to set to work; *se mettre à travailler*, to begin to work; *il a mis une heure à faire sa besogne*, it took him one hour to do his work.

(70) Do not mistake *tandis que*, whereas, for *pendant que*, during the time that.

(71) This use of past participles is of frequent occurrence in French.

(72) *Linge*, literally 'linen.'

(73) Nouns taken in a partitive sense only require *de* before them when they are preceded by an adjective (not in the superlative relative) which does not form a compound word with the following noun.

(74) The use of the infinitive in this and similar expressions is considered more elegant than that of the past participle.

(75) The adverbs *si*, *aussi*, *plus*, *mieux*, *trop*, etc., must be repeated before every adjective, participle, or adverb modified by them.

(76) *Davantage* is preferred to *plus* at the end of a sentence.

(77) Do not mistake *tâcher*, to try, for *tacher*, to stain.

(78) *Songer* may also be rendered by 'to dream.'

THE 1891 CERTIFICATE EXAMINATION.

BY DR. GEORGE BEACH, M.A.,

Co-Author of 'Our Mother Tongue,' 'Arithmetic for Girls,' Author of 'Elements of English,' 'Entertaining Readers.'

ONE of the most important papers that will be set before the student is that upon English. It involves, as we know, either in first or second year, or in both years, not only a very considerable knowledge of the history of the language and of several standard works, but considerable skill in paraphrase, composition, parsing, and analysis. In addition, the critical faculty and appreciation of literary excellence must be fairly well developed before some of the questions on *style*, *scope*, and *character of the 'dramatis personæ,'* can be answered. As our readers are too advanced to need examples of parsing and analysis, and as Model Answers of Scholarship English Questions are now appearing in this journal, it would be waste of time to give specimens here. We would, therefore, simply mention a few points only where omissions or mistakes occur.

Analysis:

(*a*) Subordinate sentences should not only be named as such in the '*Kind of Sentence*,' column, but should also appear in the proper column of their principal sentences.

(*b*) Adjective sentences should not be said to qualify their principal sentence, but the particular word in it affected by this subordinate sentence.

(*c*) Many adjective sentences containing '*where*' = (in which) are erroneously styled adverbial. In these cases great care is often necessary.

(*d*) The introductory and redundant '*it*' used in apposition to some subsequent noun sentence is frequently puzzling.

(*e*) Contracted sentences containing such words as *like*, *than*, *as*, must be carefully dealt with. A pitfall should always be looked for when these words occur.

(*f*) Although as a rule no subordinate sentence can exist without being contained in a principal sentence, yet there is one curious exception due to the assertive or verbal power of a conjunction.

(*g*) It should be never rashly assumed that the verb '*to be*' is copulative, for it may mean '*to exist*,' and then it may constitute by itself a predicate like any other verb.

Examples:

(*b*) 'This is he *of whom I spake*.' The adjective sentence qualifies the *word* 'he.'

(*c*) 'I remember the house *where I was born*.' The last four words are an adjective sentence qualifying '*house*.'

(*d*) '*It* cannot be *that he denies it*.' The subject of '*cannot be*' is the noun sentence '*he denies it*,' which is in apposition to the redundant '*it*.'

(*e*) 'You are taller than John.' Supply the words [*is tall*] after '*John*.'

(*f*) 'Ah! happy woods! Ah! pleasing shade!
Ah! fields beloved in vain,
Through which my careless childhood strayed.'
There is here no principal sentence containing the adjective sentence of the third line.
Another sentence is 'Oh! *that I had the wings of a dove*,' where a noun sentence is a sort of object after the interjection '*Oh*.'

(*g*) 'God *is*, and *is* the rewarder of them that fear him.' The first '*is*' equals an ordinary verb, the second '*is*' is copulative.

Parsing:

(*a*) When an active verb is parsed, the object it governs should also be stated.

(*b*) A verb should not be said to agree with its nominative, but its subject.

(*c*) Generally speaking, intransitive verbs and transitive verbs in the passive voice cannot govern, but the former may nevertheless take cognate objects, as 'They ran a *race*,' and the latter, if governing two objects in the active, may retain one of them in the passive, as 'The sailor was taught *navigation*.'

(*d*) The different varieties of the nominative absolute, the adverbial object, the dative case, should be well understood.

(*e*) The use of *as* as a relative pronoun and of the idiomatic use of '*whom*' after '*than*' must be noted.

(*f*) Such words as relative pronouns, participles, gerunds, connective adverbs should have their *double* functions mentioned.

(*g*) The gerundial infinitive must be studied.

(*h*) Prepositions as well as verbs may govern noun sentences.

GRAMMATICAL POINTS ABOUT THE PLAY. (*King John*)

The subjoined collection of instances has cost many hours work, and has been compiled to illustrate not only Shakespeare's peculiarities of vocabulary and linguistic structure, but those of the literary age in which he lived.

Only a comparatively few examples are given, but in many cases the careful student will find others, and in any event will greatly benefit by critically considering them. It is greatly to be regretted that limited space forbids us to give the passages *in extenso*, but they can easily be found by the references.

NOUNS AND PRONOUNS:

Unusual plurals of abstract nouns, Act IV., Scene 2, Line 64; Act IV., Scene 2, Line 102; Act V., Scene 1, Line 51; Act V., Scene 2. Line 7.

Double nominative, Act V., Scene 7, Line 59.

Double Genitive, Act IV., Scene 2, Line 299.

Good instance of *dative*, Act III., Scene 4, Line 145.

Plural nominative, with *singular verb*, Act V., Scene 2, Line 42; Act III., Scene 1, Line 289; Act IV., Scene 1, Line 120.

Singular nominative, with *plural*, Act III., Scene 1, Line 295; Act V., Scene 3, Line 2.

Objective instead of nominative. Act IV., Scene 2, Line 165; Act V., Scene 6, Line 32.

'*You*' and '*ye*' *both nominative* in the same sentence, Act V., Scene 2, Line 91.

'*Who*' when *antecedent* is *irrational*, Act II., Scene 1, Line 575; Act V., Scene 7, Line 22.

'*What*' as a *simple relative*, Act V., Scene 2, Line 75.

Repeated antecedent, Act I., Scene 1, Line 119; Act III., Scene 1, Line 39.

Disagreement of relative with antecedent, Act II., Scene 1, Line 216.

Omission of nominative relative, Act III., Scene 3, Line 21; Act IV., Scene 2, Line 69; Act IV., Scene 3, Line 34.

Omission of objective relative, Act III., Scene 4, Line 45; Act IV., Scene 2, Line 142.

Ordinary personals used as reflexives, Act II., Scene 1, Line 156; Act II., Scene 1, Line 159; Act III., Scene 1, Line 63; Act V., Scene 7, Line 55.

The adverbial 'THE' *with comparatives*, Act I., Scene 1, Line 183; Act II., Scene 1, Line 13; Act V., Scene 6, Line 21.

Emphatic '*the*' *before* '*which*,' Act II., Scene 1, Line 396; Act IV., Scene 2, Line 50; Act V., Scene 4, Line 51.

The versus *that*, Act II., Scene 1, Line 109; Act II., Scene 1, Line 512.

'*a*' *before a numeral*, Act I., Scene 1, Line 183.

'*a*' *equal one*, Act V., Scene 7, Line 64.

Transposition of '*a*,' Act IV., Scene 2, Line 27.

Plural adjectives other than demonstratives, Act II., Scene 1, Line 357; Act V., Scene 4, Line 7.

Superlative for comparative, Act II., Scene 1, Line 281—332.

More = greater, Act II., Scene 1, Line 34.

VERBS: For violation of Syntax, see '*Nouns and Pronouns*.'

Remnant of impersonal construction, Act V., Scene 3, Line 95.

Used reflexively, Act V., Scene 2, Line 260; Act V., Scene 3, Line 13.

Transitive used intransitively, Act III., Scene 4, Line 73; Act III., Scene 4, Line 170.

Omission of verbs of motion, Act I., Scene 1, Line 27; Act II., Scene 1, Line 295; Act III., Scene 3, Line 6; Act V., Scene 7, Line 29.

The infinitive '*to*' *omitted and inserted in the same sentence*, Act I, Scene 1, Line 134; Act V., Scene 2, Line 39; Act V., Scene 2. Line 138.

Future for subjunctive, Act II., Scene 1, Line 33.

Participial '*-ed*' *omitted after* '*-d*' *and* '*-t*, Act II., Scene 1, Line 73; Act IV., Scene 1, Line 61.

PREPOSITIONS:

Omission of preposition with relative, etc, Act II., Scene 1, Line 264; Act V., Scene 2. Line 189.

'*In*' *governing the gerund like* the French '*en passant*', Act V., Scene 2, Line 32.

Idiomatic use of '*at*'			= by, Act V., Scene 2, Line 75.
,,	,,	,,	= under, Act V., Scene 2, Line 80.
,,	,,	'*by*'	= away, Act IV., Scene 3, Line 94.
,,	,,	'*from*'	= according to, Act III., Scene 1, Line 210.
,,	,,	,,	= away from, Act IV., Scene 1, Line 86.
,,	,,	'*in*'	= on, Act I., Scene 1, Line 99.
,,	,,	'*of*'	= at, Act IV., Scene 1, Line 114.
,,	,,	,,	= from, Act III., Scene 4, Line 55.
,,	,,	,,	= out of, Act III., Scene 4, Line 56.
,,	,,	,,	= with respect to, Act I., Scene 1, Line 63.
,,	,,	'*on*'	= of, Act IV., Scene 2, Line 92.
,,	,,	'*or*'	= before, Act V., Scene 6, Line 44.
,,	,,	'*to*'	= ready for, Act V., Scene 6, Line 26.
,,	,,	,,	= in addition to, Act I., Scene 1, Line 144.
,,	,,	'*upon*'	= immediately after, Act II., Scene 1, Line 50.
,,	,,	,,	= for, Act II., Scene 1, Line 597.
,,	,,	,,	= in support of, Act I., Scene 1, Line 34.
,,	,,	,,	= out of, Act IV., Scene 2, Line 114.
,,	,,	'*with*'	= by, Act II., Scene 1, Line 567.
,,	,,	'*withal*'	= with, Act III., Scene 1, Line 327.

CONJUNCTION:

Idiomatic use of '*but*' = if not, Act V., Scene 4, Line 50.

Redundant use of '*that*,' Act I., Scene 1, Line 95; Act II., Scene 1, Line 89; Act III., Scene 3, Line 57.

Construction changing with change of thought, Act II., Scene 1, Line 250; Act II., Scene 1. Line 271; Act II., Scene 1, Line 568.

Queer ellipse, Act V., Scene 2, Line 258.

Altered accents nearer beginning, Act II., Scene 1, Line 421; Act III., Scene 4, Line 29.

Altered accents nearer ending, Act III., Scene 4, Line 35.

'*-ed*' *mute and sonant in the same line*, Act II., Scene 1, Line 506; Act IV., Scene 2, Line 200.

Contraction of '*-est*' *before dentals*, Act II., Scene 1, Line 177.

Defective interruption of line to denote action, Act I., Scene 1, Line 161.

From the above list many questions can be answered. Some other excellent points are mentioned in Moffatt's edition, pp. 138 to 145.

For remarks on PARAPHRASE AND COMPOSITION, see 'Essay Writing and Paraphrasing,' by C. J. Dawson, Esq., B.A., an excellent little work, highly reviewed by 'Schoolmaster,' 'University Correspondent,' 'Civil Service Gazette,' &c. We hope in another issue to say something on the *style* of the various authors.

CERTIFICATE ROUTINE FOR **SEPTEMBER, 1891** (MEN AND WOMEN, FIRST YEAR).

DAYS	FIRST WEEK				SECOND WEEK				THIRD WEEK				FOURTH WEEK			
	I.	II.	III.		I.	II.	III.		I.	II.	III.		I.	II.	III.	
MONDAY	Training of the Ear	Read 'Passing of Arthur'	Euclid, Book III. Props. 24 to 32, *or* Repairing Underclothing		General Principles of Teaching	Language of the Arthurian Poems	Euclid, Book III., Props. 33 to 37, *or* Diagram of an Infant's Shirt		Cultivation of the Intelligence	Language of Bacon, *or* the Arthurian Poems	Euclid, Book III., Props. 1 to 7, *or* Any Needlework		Training of the Voice	Parsing and Analysis from Essay V. *or* Lines 5 to 15 of 'Coming of Arthur'	Euclid Book II., *or* Organs of Respiration	
TUESDAY	Chief Dates from 1461 to 1558	Problems involving Simple Equations, *or* Construction of the House	Geography of Cape Colony		Chief Dates from 1558 to 1646	Stocks, *or* Compound Interest	Geography of Natal and the Transvaal		History from 1558 to 1646	Evolution of Algebra, *or* Cleanliness of the Home	Remainder of British Settlements in Africa		Chief Dates from 1646 to 1688	Equation of Payments *or* Stocks	Recent extensions of British Territory in South Africa	
WEDNESDAY	Compound Interest	History from 1461 to 1551	Sequence of Intellectual Development		Exchange *or* Theory of Proportion	Simultaneous Equations of one Degree, *or* Warming the House	Study Grammar from Text Book		Stocks, *or* Compound Proportion	Simultaneous Quadratics, *or* Composition of Air	Euclid, Book I. Props. 27 to 48, *or* Cutting out of an Infant's Shirt		Averages	Problems involving Simultaneous Equations of one Degree *or* Ventilation	Revise Geography of British Africa	
THURSDAY	History from 1789 to 1802, *or* Revision	Problems involving Quadratic Equations, *or* Furnishing of the House	Map of Cape Colony		History from 1802 to 1808, *or* Revision	Involution of Algebra, *or* Lighting the House	Geography of Natal and the Transvaal		Tables of the Stuart and Hanoverian Dynasties	Present Worth *or* Simple Proportion	Map of British Possessions in South Africa		History from 1646 to 1688	Mixtures, *or* Theory of Interest	Revise Geography of British Africa	
FRIDAY	Any Revision	Deductions on Euclid, Book I., *or* Diagram of an Infant's Shirt	Parse and Analyse from Essay XXV., *or* Lines 192 to 201 of 'Passing of Arthur'		Constitutional Changes and Literature of the Period	Deductions on Euclid, Book II., *or* Cutting out of an Infant's Shirt	Write a Life of Bacon		Any Revision	Deductions on Euclid, Book III., 23 to 37, *or* Any Needlework	Write Notes of a Lesson as for Stand. VI. upon Lines 20 to 33 of 'Coming of Arthur'		Simultaneous Quadratic Problems *or* Respiration	Deductions on Euclid, Book III., *or* Questions on Needlework	Give in good English the contents of the 'Passing of Arthur'	
SATURDAY	Notes of a Writing Lesson to Standard II.	Repetition, Penmanship, etc.	Music. — Value of Notes and Rests *or* Pulses and Accents	Examination	How to teach Spelling	Repetition, Penmanship, etc.	Music. — Signatures of the *Simple* Times. *or* Two, Three, and Four Pulse Measures	Examination	Revise any School Management	Repetition, Penmanship, etc.	Music. — Accent and contents of Bars *or* Continuations. Rests, &c.	Examination	Sequence of Intellectual Development	Repetition, Penmanship, etc.	Music. — Transcription from one time to another	Examination

CERTIFICATE ROUTINE FOR SEPTEMBER, 1891 (MEN AND WOMEN, SECOND YEAR).

DAYS	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	The Summary Register and how to keep it	Analyse (and parse difficult words of) Lines 192 to 205 of 'Coming of Arthur,' *or* Lines 313 to 324 of Scene I., Act II., King John	Euclid, Book IV., Props. 9, 10, 11, 12, *or* Print Patch	School Premises. — Warming, Colouring, Lighting	Paraphrase Lines 65 to 74 of 'Passing of Arthur,' *or* Lines 235 to 248 of Scene 1, Act II., King John	Deductions upon Euclid, Book IV., *or* Diagram of a Boy's Shirt	Notes of a Dictation Lesson to Standard VI.	Paraphrase from Bacon's Second Essay, *or* Lines 373 to 387 of Scene I., Act II., King John	Euclid, Book IV., *or* Linen Patch	School Organisation	Paraphrase Lines 29 to 41 of Scene I., Act III., King John	Permutations and Combinations, *or* Expenses of Clothing
TUESDAY	Dates from 1461 to 1558, *or* from 1815 to 1820	Insurance	As in First Year, *or* Geography of Quebec and Ontario	Dates from 1558 to 1646, *or* from 1789 to 1802	Stocks	As in First Year, *or* General Political Geography of United States	History from 1376 to 1461, *or* Revision of any subject	Discount	As in First Year, *or* General Political Geography of United States	Dates from 1646 to 1688 *or* Constitution Changes from 1789 to 1820	Definitions of Arithmetical Terms	As in First Year, *or* Geography of Manitoba and N.W. Territories
WEDNESDAY	Any Revision	Binomial Theorem *or* Choice of Food	The Process of Reasoning	Binomial Theorem, *or* How to spend a limited weekly income.	Any Revision	Contents of Acts I. and II. of King John	Logarithms, *or* Investments	Stocks	Any School Management	Any Revision	Ratio and Proportion *or* Investments	As in First Year, *or* General Physical Geography of Mexico
THURSDAY	History from 1808 to 1815	Stocks	As in First Year, *or* Map of Quebec	History from 1815 to 1812	Race Problems, *or* Notes of a Lesson on 'The Chemistry of Cooking,' and 'Neatness in Dress'	As in First Year, *or* Geography of Nova Scotia and New Brunswick	History from 1812 to 1820	Miscellaneous Arithmetical Problems	As in First Year, *or* Map of Ontario	History from 1461 to 1688 *or* Industrial Conditions from 1789 to 1820	Compound Interest	As in First Year, *or* Geography of British Columbia and Vancouver I.
FRIDAY	Binomial Theorem, *or* Beverages for Sick	Euclid, Book IV., Props. 13, 14, 15, 16, *or* Diagram of a Boy's Shirt	Composition on 'How oft the sight of means to do ill deeds makes ill deeds done'	Logarithms, *or* Cooking ordinary flesh meat	Definitions of Euclid, Book V., *or* Cuttingout in paper of a Boy's Shirt	Analyse (and parse difficult words of) Lines 1 to 9 of Bacon's First Essay, *or* Lines 587 to 598 of Scene 1, Act II., King John	Logarithms, *or* Duties of a Housemaid	Deductions upon Euclid, Book III., *or* Diagram of a Child's Muslin Pinafore	Analyse (and parse difficult words of) Lines 202 to 211 of Scene I., Act III., King John	Surds, *or* Economy of Food	Euclid, Book VI., Props. 1 and 2, *or* Diagram of a Child's Muslin Pinafore	Write a Life of Tennyson
SATURDAY	Formation of Habits and Character	Repetition, Penmanship, &c.	Music. — Value of Notes and Rests, *or* All the measures in common use	Examination	Health of Scholars and Teachers	Repetition, Penmanship, &c.	Music. — Signature of the Compound Times, *or* Division of Pulses into thirds and quarters	Examination	Spencer, *or* Locke	Repetition, Penmanship, &c.	Music. — Accent, Syncopation, and Contents of Bars and Measures	Examination	The Admission Register, and How to keep it	Repetition, Penmanship, &c.	Music. — Transcription from one Time to another	Examination

QUESTIONS FOR FIRST YEAR.

First Week.

1. Write a Largehand copy of '*Subtle Analysis.*'
Write a Smallhand copy of '*Meander's amber waves in lingering labyrinths creep.*'

2. Write from dictation :—

'But for some inscrutable reason | the Act was interpreted | in this country | as simply giving every convict | a right, | after a certain period of detention, | to claim a ticket-of-leave, | provided, | he had not grossly violated | any of the regulations of the prison | or misconducted himself | in some outrageous manner. | It would be superfluous | to examine the working of such a system. | A number of scoundrels | whom the judges had sentenced | to be kept in durance | for so many years, | were without any conceivable reason | turned loose upon society | long before the expiration of their sentence.‖

3. Name and describe the several methods with which you are acquainted for teaching young children to read.

4. Draw up a time table for a large boys' school, of 300 average attendance, with full staff of teachers and four class rooms.

5. Write down the major diatonic scale in two different positions on the treble clef. Write the same in one position on the base clef, Put the names of the notes, with the proper sharps or flats when required) over each.

(*For Tonic Sol-faists.*) Which are the strong tones in the scale; and which are the leaning and expectant tones? Why are they so termed?

6. Make a diagram to indicate the ordinary range of the four different kinds of voices, *viz.*, bass, tenor, alto, soprano.

(*For Tonic Sol-faists*) Describe three pulse measure in three different forms, giving an example of each.

7. Write an essay on 'The changes in the English language since the time of Bacon,' *or* 'Leslie's Life of Johnson.'

8. Paraphrase lines 9 to 17 of 'Passing of Arthur.'

9. Contrast the fauna of the Torrid with the Frigid Zone.

10. Briefly describe the extent of the English, German, French, and Portuguese '*sphere of influence*' in Southern and Central Africa.

11. Narrate the disputes between Henry II. and the Pope, and the growth of Papal authority in the reign of Henry III.

12. (*Men only.*) Give the provisions of the most important statutes enacted between 1788 and 1800.

(*Women only.*) Give the date, chief circumstances, and results of the battle of Crécy.

13. (*Men only.*) A purse holds 19 crowns and 6 guineas. Now 4 crowns and 5 guineas fill $\frac{11}{63}$ of it. How many will it hold of each? 21 crowns, or 63 guineas. Ans.

(*Women only.*) Draw a diagram on sectional paper of a woman's chemise.

14. (*Men only.*) If $\frac{2a^2 - 3b^2}{a^2 + b^2} = \frac{3}{41}$. Find the ratio of a to b.
As 5 to 4. Ans.

(*Women only.*) Cut out in paper the left half of an infant's shirt.

15. (*Men only.*) The diagonals of a rhombus are 88 yards and 110 yards. Find the area. 9,680 sq. yds. Ans.

(*Women only.*) Find the present value of £151 17s. 6d. due at the end of four years at $5\frac{3}{8}$ per cent. £125. Ans.

16. (*Men only.*) In a circle whose radius is 12 ft., what must be the length of the arc so that the area of the sector will be 100 sq. ft.? $16\frac{2}{3}$ ft. Ans.

(*Women only.*) If I lay out £1,110 in the Four per Cents. at $92\frac{1}{2}$, at what price should they be sold to produce a gain of £100?
£$100\frac{2}{3}$. Ans.

17. (*Men only.*) If a straight line be divided into two equal and also into two unequal parts, the rectangle contained by the unequal parts, together with the square of the line between the points of section, is equal to the square on half the line.

Divide a line into two parts such that the square upon one of them shall be double the square on the other.

(*Women only.*) Name the special duties of a housemaid, a parlour-maid, and a maid of all work.

18. (*Men only.*) If two circles touch one another internally, they shall not have the same centres.

Find the largest circle which can be drawn to touch the larger circle internally and also the smaller circle externally.

(*Women only.*) Write Notes of a Lesson on '*Co-operative Stores.*'

Second Week.

1. Write a Largehand copy of '*Physical Education.*'
Write a Smallhand copy of '*Honesty is the best policy.*'

2. Write from dictation :—

'The Prince Consort | was little more than forty-two years of age | when he died. | He had always appeared | to be in good | if not robust health; | and he had led | a singularly temperate life. | No one in the kingdom | seemed less likely | to be prematurely cut off, | and his decease | fell upon the whole country | with the shock of a calamitous surprise. | The regret was universal | and especially for the wife | so tenderly cherished, | who was condemned to be so soon bereaved. | Every testimony demonstrates | that a domestic happiness | rare even among the obscurest | was vouchsafed to the Queen and Prince.‖

3. What uses may be made of the blackboard in a reading lesson?

4. In teaching mental arithmetic, show the importance of a thorough acquaintance with the aliquot parts of a £. Give instances of its use.

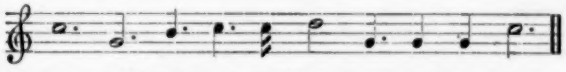
5. Express the duration of two minims by 3 notes—by 5 notes—by 7 notes, and write down the rests for four beats, in three different ways.

(*For Tonic Sol-faists.*) What are the mental effects of *d*, *m*, *s*, *f*, and *l*, respectively, when sung slowly? How are those effects modified when sung fast?

6. For the dots in the following passage of music write down—

(1) Notes of the same duration.

(2) Rests of the same duration :



(*For Tonic Sol-faists.*) Explain the following symbols : *p*, *pp*, *m*, *f*, *ff*, *cres. dim.*, *fz*, *ral.*

7. Analyse lines 79 to 87 of '*Passing of Arthur*,' and parse the following words :—
King, league, back, land, upheaven, to sink, where, far, away, circle.

8. What ideas of religion and magic does Tennyson depict as obtaining in the time of Arthur?

9. Draw a map showing the British Possessions in Africa.

10. Describe the shape of the earth, and prove the accuracy of your statements by illustrations.

11. What do you know of the divisions and quarrels that led to the battle of Bosworth, the engagement itself, and its results?

12. (*Men only.*) What foreign military operations did we undertake between 1788 and 1800?

(*Women only.*) Give a short account of the changes in the Constitution in the Plantagenet period.

13. (*Men only.*) If the cube of x varies as the square of y, and if $x = 3$ when $y = 5$, find the equation between x and y.
$5x = 7y$. Ans.

(*Women only.*) Draw a diagram on sectional paper of an infant's shirt.

14. (*Men only.*) The sum of three numbers in Arith. Prog. is 12, and the sum of their squares is 66. Find them. 1, 4, 7. Ans.

(*Women only.*) Cut out in paper the right half of a pair of drawers for a child of five.

15. (*Men only.*) Find the area of the portion between the two concentric circles whose radii are 12 ft. and 10 ft. 44π. Ans.

(*Women only.*) What is the premium of insurance upon £3,208 17s. 1d. at £$2\frac{3}{8}$ per cent.? £83 8s. $7\frac{1}{4}$d. Ans.

16. (*Men only.*) A square and an equilateral triangle have the same perimeters; compare their areas. As $9 : 4\sqrt{3}$. Ans.

(*Women only.*) The diagonal of a square is 353·55. What is the length of the side?
250. Ans.

17. (*Men only.*) If a straight line be bisected and produced to any point, the square on the whole line thus produced, and the square on the part of it produced, are together double the square on half the line bisected, and of the square on the line made up of the half and part produced. Endeavour to include this and the preceding proposition in one enunciation.

(*Women only.*) Name different ways in which rice, potatoes, eggs, may be cooked either alone or in combination, so as to make a good and wholesome meal at a comparatively small expense.

18. (*Men only.*) If two circles touch each other internally, the straight line joining their centres shall pass through the point of contact. If in two circles which touch there be drawn parallel diameters, an extremity of each diameter and the point of contact shall be in the same straight line.

(*Women only.*) Write down briefly any advice which might be helpful to a schoolgirl of 13 on leaving for a place as under-nurse-maid.

Third Week.

1. Write a Largehand copy of '*Singularly beloved.*'

Write a Smallhand copy of '*Peace is the consequence of exhaustion.*'

2. Write from dictation :—

If ever there was a creature of law, | and of authority | acting in the place of law, | it was the landlordism of Ireland. | It was imposed | upon the country and the people. | It could not plead | in support of any of its alleged rights | even that prescriptive title | which grows up | with the development of an institution | that has maintained its place | during all the ages | to which tradition or memory can appeal. | It was, | as compared with kindred European institutions, | a thing of the day before yesterday. | It was the creation of conquest, | the impost of confiscation.‖

3. What is the best method of preparing the children who have to pass in writing in Standard I.?

4. In what respect is arithmetic one of the best means of mental discipline?

5. Define rhythm, accent, and time. Write a passage of music of 6 bars in $\frac{3}{4}$ time, varying the notes in each bar.

(*For Tonic Sol-faists.*) When you pass into the *soh* key, what do *m*, *l*, *r*, *t*, and *s* become respectively, and what new tone is introduced? How do you name it?

6. Explain the succession of sharp keys, and show how they are derived the one from the other.

(*For Tonic Sol-faists.*) What is meant by *transition*. Give two cases of it, one with, and one, without a distinguishing tone.

7. Explain these terms, giving their etymology :—harried, puissance, anon, foster-mother, horde, travail, clarions, liege, posterngate.

8. Select instances of Tennyson's melodious alliteration.

9. Describe the formation of snow, hoar-frost, hail, rain, dew, and fog.

10. What do you know of the Nile overflow?

11. What was the 'Statute of the Six Articles? Give an account of the chief proceedings under it, and of those who suffered under it.

12. (*Men only.*) Describe the industrial condition of 'the masses' from 1788 to 1800.

(*Women only.*) Write an account of the Puritans, their political and religious principles, and chief leaders.

13. (*Men only.*) Sum the following series to n terms :—$y^a + 2b$; $y^4 + 4b$; $y^6 + 6b$, etc. $\frac{y^2(y^{2n}-1)}{y^2-1} + (bn(n+1)$. Ans.

(*Women only.*) Draw a diagram on sectional paper of a pair of drawers for a child of five.

14. (*Men only.*) To each of three consecutive terms of a Geometrical Progression, the second of the three is added. Show that the three resulting quantities are in Harmonical Progression.

(*Women only.*) Write down the measurements of a shirt for an infant two years old.

15. (*Men only.*) A square and an equilateral triangle have the same area. Compare their perimeters. $2 : \sqrt[4]{27}$. Ans.

(*Women only.*) Find what decimal multiplied by 175 will give the sum of $\frac{1}{4}$, $\frac{1}{12}$, $\frac{1}{24}$, and $3\frac{1}{2}$. .03. Ans.

16. (*Men only.*) Find the radius of a circle when an angle of 25 degrees at the circumference has an arc of 100 inches.

$114\frac{8}{11}$ inches. Ans.

(*Women only.*) What principal in 3 years 73 days will become £10 1s. 10½d., interest being at 6½ per cent.? £8 8s. 2⅔d. Ans.

17. (*Men only.*) If the square described on one side of a triangle be equal to the sum of the squares described on the other two sides, the triangle is right-angled.

Let ABCD be a rectangle, P a point within it, the squares of PA, PC, are together equal to the squares of PB, PD.

(*Women only.*) Name the principal illnesses to which young children are subject. Describe the symptoms which frequently precede such ailments, and state the course then to be followed.

18. (*Men only.*) The straight line drawn at right angles to the radius of a circle from the extremity of it falls without the circle. Draw a straight line to touch two given circles.

(*Women only.*) Show the necessary weekly expense in an agricultural district of a labourer's household, consisting of himself, wife, and three children under seven years of age.

Fourth Week.

1. Write a Largehand copy of '*Politically defunct.*'

Write a Smallhand copy of '*Indulgence in plausible sophisms.*

2. Write from dictation :—

But on this occasion the Speaker was literally powerless. There was no authority that could overawe that House. Men of education and position—university men, younger sons of peers, great landowners, officers in crack cavalry regiments, the very *élite*, many of them, of the English aristocracy, became for the moment merely a furious and frantic mob. They roared, hissed, yelled, and gesticulated. The shrill 'cock-crow,' unheard in the House of Commons for a whole generation, shrieked once more in the ears of the bewildered officials.

3. Give instances showing the difficulty of teaching correct spelling, from the different ways in which the same sound is represented.

4. Why is dictation of examples in arithmetic to be preferred to setting the sum on the blackboard?

5. Transpose the following passage of music to the key of A♭.

(*For Tonic Sol-faists.*) Explain the ray mode; the soh mode; the la mode. How does the modern minor differ from them?

6. Write down the *air* of 'God Save the Queen' correctly, either in the Staff or Tonic Sol-fa notation.

7. Explain the following passages from 'Bacon's Essays :' '*The Stoics bestowed too much cost upon death;*' '*The sweetest canticle is* '*Nunc Dimittis*;' '*Vindictive persons lead the life of witches,*' '*To speak in a mean.*' '*A man that is busy and inquisitive;*' *or* the following extracts from 'Leslie's Johnson' :—'*tormented by hypochondriacal tendencies,*' '*Touched for the king's evil,*' '*Blinking Sam,*' '*Macpherson of Ossian celebrity,*' '*This only instance of contumacy to my father;*' '*Three of the most eminent men with whom Johnson came in contact in later life had also been students at Oxford.*'

8. Briefly define subordinate sentences, and give instances of the various kinds.

9. Explain the causes of the monsoons, and give particulars as to their duration, character, and effects.

10. What do you mean by 'The Barbary States'? Write down a few facts respecting their government, climate, industries, races, and flora.

11. Describe the changes made in the reign of Queen Mary, and the character and death of Cranmer.

12. (*Men only.*) Mention six authors (with their principal works) who were living at any time between 1788 and 1800.

(*Women only.*) Give an account of the charges against Mary Queen of Scots, and of her trial and death.

13. (*Men only.*) $\frac{49x^2}{4} + \frac{48}{x^2} - 49 = 9 + \frac{6}{x}$ Find *one* value of x.

2 or $\frac{-8}{7}$ or $\frac{-3 \pm \sqrt{93}}{7}$ Ans.

(*Women only.*) Describe the various kinds of darns and their use, as to a pupil teacher.

14. (*Men only.*) What two numbers are those which being both multiplied by 27, the product of the first is a square, and the product of the second the root of that square; but being both multiplied by 3, the product of the first is a cube, and the second the cube root of that cube? 243 and 3. Ans.

(*Women only.*) Give directions for the cutting out of an infant's shirt, observing the due proportions and economising the material.

15. (*Men only.*) Find the least of the two angles subtended by the hands of a watch at 25 minutes past 12. $137\frac{1}{2}°$. Ans.

(*Women only.*) If a ton of turnips last 25 sheep for a fortnight, how much will be required to supply 40 sheep during next January and February? 6 tons 17 cwt. 16 lbs. Ans.

16. (*Men only.*) The earth moving round the sun at the rate of 1,135 miles per minute takes 365¼ days to complete her revolution, show how to find the distance of the earth from the sun, supposing the orbit to be circular.

(*Women only.*) Divide 1,400 into four parts, which shall have the same ratio to one another as the cubes of the first four natural numbers. 14, 112, 378, 896. Ans.

17. (*Men only.*) Describe a square that shall be equal to a given parallelogram. Find a square that shall be equal to any given number of rectilineal figures.

(*Women only.*) State the principal materials used in this country for clothing by the children of our elementary schools, the price per yard of such material, and the cost of fitting out a girl of 12 years of age with a duplicate of each article required.

18. (*Men only.*) Show how to find the centre of a given circle. Through a given point within a circle draw a chord which shall be bisected by that point.

(*Women only.*) Describe any good system of ventilation for an elementary schoolroom.

SECOND YEAR.

First Week.

1. As in First Year.

2. Write from dictation:—

The business of the psychologist | is to trace out | the statics and dynamics | of a typical human mind, | to resolve compound mental operations | into their proximate and ultimate elements, | and to explain the mechanism | by which mental results are obtained. | The educator | will accept these theoretical inductions and deductions, | and will be guided by them in practice, | possibly repaying the debt, | by collecting fresh facts | for the elucidation of the theorist, | as he has a favourable opportunity, | of witnessing the development of minds | from a comparatively early age.‖

3. Make a copy of a school register for a week for a class of 11 children which shall show a daily average attendance of eight.

[One boy fell sick on Tuesday afternoon, and only made three attendances, and no other scholar made less than three, the school having been open 10 times.] State the general rule for finding averages. What averages are required in the annual return to the Education Department?

4. What mechanical remedies can be applied when a schoolroom is very noisy?

5. As in First Year.

6. Ditto.

7. Ditto.

8. Ditto.

9. (*Men only.*) As in First Year.

(*Women only.*) Describe briefly the mountain system of North America.

10. (*Men only.*) As in First Year.

(*Women only.*) Outline the history of Canada, and explain the present system of Government.

11. (*Men only.*) As in First Year.

(*Women only.*) What foreign conquests did we make between 1793 and 1802, and what became of them at the treaty of Amiens.

12. (*Men only.*) As in First Year.

(*Women only.*) Draw up a list of the Premiers between 1789 and 1823. Name also the principal parliamentary orators of that period.

13. (*Men only.*) Explain this statement—'This constant multiplier $\frac{1}{\log ab}$ is called the MODULUS of the system of which the base is b with reference to the system of which the base is a.

(*Women only.*) Draw a diagram on sectional paper of a woman's night dress.

14. (*Men only.*) Given log 2 = ·3010300, find log 128, log 125, and log 2500. 2·1072100, 2·0969100, 3·3979400. Ans.

(*Women only.*) Cut out in paper the left half of a boy's shirt.

15. (*Men only.*) Find the surface of a cube whose diagonal is 5 feet. 50 sq. feet. Ans.

(*Women only.*) As in First Year.

16. (*Men only.*) Find the total surface of a cylinder whose radius and height are 2 inches and 16 inches respectively. $\frac{\pi}{2}$ sq. ft. Ans.

(*Women only.*) As in First Year.

17. (*Men only.*) Describe a square about a given circle. Show that no rectangle but a square can be described about a circle.

(*Women only.*) Describe the way in which a mutton chop, a small sole, and a mackerel may be dressed for dinner.

18. (*Men only.*) As in First Year.

(*Women only.*) What distinctive properties are contained in the fibrin, albumen, and gelatine of the flesh of animals? Why are salt meats less nutritious than fresh meats?

Second Week.

1. As in First Year.

2. Write from dictation:

Discipline is only a means to an end, | that end being exercise of faculty | in a real world | beyond the reach of radical change, | whose work, | and not our private will, | has to be done. | The period allowed for mental gymnastics | being brief, | it is desirable | that the utmost should be made | of so short a preparatory season, | and the only way | to fulfil that requirement | is to assist Nature | as far as possible, | and take advantage of the opportunities | she spontaneously offers.‖

3. In the absence of a sufficient number of desks, how would you attempt to remedy the defect?

4. Draw up a time table for a mixed school of 80 children in the country, the necessary staff being provided.

5. As in First Year.

6. Ditto.

7. Ditto.

8. Ditto.

9. (*Men only.*) As in First Year.

(*Women only.*) Describe the two lake systems of British North America.

10. (*Men only.*) As in First Year.

(*Women only.*) Enumerate, giving particulars, the principal rivers of the United States.

11. (*Men only.*) As in First Year.

(*Women only.*) Describe the conditions of the Union between Great Britain and Ireland.

12. As for First Year Men.

13. (*Men only.*) Show how to find the number of permutations of n dissimilar things taken r at a time.

(*Women only.*) Draw a diagram on sectional paper of a boy's shirt.

14. (*Men only.*) A stable has six stalls in it. If four horses are to be placed therein, in how many ways can this be done? 360. Ans.

(*Women only.*) Cut out in paper the right half of a child's muslin pinafore.

15. (*Men only.*) Find the volume of a prism whose base is 3 sq. feet, and height 1 foot 9 inches. 5¼ c. ft. Ans.

(*Women only.*) As in First Year.

16. (*Men only.*) Find the volume of a sphere whose radius is 2½ ft. $\frac{125}{6}\pi$ c. ft. Ans.

(*Women only.*) As in First Year.

17. (*Men only.*) Inscribe an equilateral and equilateral pentagon in a given circle.

The straight lines which join the angular points of a regular pentagon which are not adjacent intersect at the angular points of another pentagon.

(*Women only.*) What would be a fair annual charge per child for clothing 30 children aged from 10 to 13? State in bill form the amount of materials required, and their cost.

18. (*Men only.*) As in First Year.

(*Women only.*) 'Milk is an example of a substance containing all the requisites for supporting a healthy and vigorous existence.' Name these requisites, and their adaptation to the requirements of our system.

THIRD WEEK.

1. As in First Year.

2. Write from dictation :—

Nothing is so bewildering | to a growing mind | as a teacher's capriciousness, | a deviation from a strict rule of justice. | Teachers cannot be free | from unforced partialities; | lovable natures must exercise their subtle spell, | and odious dispositions secretly repel; | but in the pupil's presence | all scholars must be equal, | and like causes must be followed | by like effects, | like good or evil deserts | be attended by like rewards and punishments. | This is not strictly consonant | with the experience of mature life, | but it accords | with the ideal of that life, | and thus approximates to a perfect civilisation.‖

3. In teaching Geography what use would you make of wall-maps and small atlases (which can now be procured at a very cheap rate)? Discuss the respective merits of each.

4. What are the most suitable modes of correcting faults? Distinguish between the common faults of school children, showing the proper treatment for each. Take as examples, *laziness in school, coming late, untidiness, damage to school furniture, lying, bullying, sullenness.*

5. As in First Year.

6. Ditto.

7. Ditto.

8. Ditto.

9. (*Men only.*) As in First Year.

(*Women only.*) Draw a map of British North America.

10. (*Men only.*) As in First Year.

(*Women only.*) Describe the general features of Central America.

11. (*Men only.*) As for First Year.

(*Women only.*) Write a life of the younger Pitt.

12. As for First Year Men.

13. (*Men only.*) Show how to find the number of combinations of n different things taken r at a time.

(*Women only.*) Draw a diagram on sectional paper of a child's muslin pinafore.

14. (*Men only.*) In a certain town there are five letter boxes; in how many ways can a person post three letters? 125. Ans.

(*Women only.*) Write down the measurements of a shirt for a boy 13 years old.

15. (*Men only.*) A triangular pyramid on equilateral base, each of whose sides is 15 feet, has an altitude of 30 feet. Find its volume. $1125\sqrt{3}$. Ans.

(*Women only.*) As in First Year.

16. (*Men only.*) Find the volume of a cone, the radius of whose base is 4 ft. 6 ins., and whose height is equal to its circumference. $600\frac{1}{2}$ c. ft. Ans.

(*Women only.*) As in First Year.

17. (*Men only.*) Describe an equilateral and equiangular hexagon about a given circle.

The difference between the areas of the inscribed and circumscribed hexagons is equal to one-third of the inscribed figure.

(*Women only.*) Mention a few refreshing beverages suitable for a convalescent, and state how you would prepare any one of them.

18. (*Men only.*) As in First Year.

(*Women only.*) Describe the methods of washing coloured prints, brown-holland dresses, and coloured flannels.

FOURTH WEEK.

1. As in First Year.

2. Write from dictation :—

More subtle is the question | whether the unconscious operations of mind | are in every case rendered possible | by previous acts of consciousness, | whether aptitudes and immediate intuitions | are results of processes of painful volition | and arduous reflection, | which have lost through repetition | their emotional accompaniments, | and so | have seemed to have fallen, | out from the psychical | into the physical order. | When attempting to decide this question | we find ourselves in presence | of a vague spiritual atom or molecule, | which we find it hard to describe.‖

3. Write a short essay on the questions of rewards for good conduct or for proficiency.

4. In teaching History, what period would you select? Why? How would you teach it? What use may be made of this lesson for other purposes than the accumulating knowledge of historical facts?

5. As in First Year.

6. Ditto.

7. Ditto.

8. Ditto.

1. (*Men only.*) As in First Year.

(*Women only.*) Enumerate the different varieties of climate prevailing throughout the North American Continent.

10. (*Men only.*) As in First Year.

(*Women only.*) What are the occupations of people in Newfoundland, Kentucky, California, British Columbia, Texas, Lower Canada, and Pennsylvania?

11. (*Men only.*) As in First Year.

(*Women only.*) Describe any naval events of importance between 1788 and 1800.

12. As for First Year men.

13. (*Men only.*) Enunciate (*not prove*) the binomial theorem, giving the rules for the signs, co-efficients, powers and number of terms of a positive index.

(*Women only.*) As in First Year.

14. (*Men only.*) Find the eighteenth term of $(1 + x)^{20}$. $1140x^{17}$. Ans.

(*Women only.*) Give directions for the cutting-out of a boy's shirt, observing the due proportions and economising the materials.

15. (*Men only.*) Find the radius of a circle whose area is equal to that of three circles whose radii are 9, 12, and 20 ft. 25 ft. Ans.

(*Women only.*) As in First Year.

16. (*Men only.*) How often can a wine glass in the form of a cone $2\frac{1}{2}$ inches in diameter and 2 inches deep be filled out of a cylindrical tumbler 4 inches in diameter and $3\frac{1}{2}$ inches deep? $6\frac{1}{18}$ times. Ans.

(*Women only.*) As in First Year.

17. (*Men only.*) About a given circle describe a triangle equiangular to a given triangle.

When may a circle be inscribed in a rectilineal figure? Can it be inscribed in a rhombus or rhomboid?

(*Women only.*) Name any secure investments (*not* in Post Office) for small sums of money, the interest so obtained, and the methods by which such money can be withdrawn.

18. (*Men only.*) As in First Year.

(*Women only.*) Mention the different common English wild poisonous plants; and so describe them that a child may be warned against them.

The names of all Certificate Candidates, not being students in any Training College, must be notified to the Department before the 1st of October.

All students should procure Hughes's Certificate Copy Book. No other exactly reproduces the Departmental style and requirements.

CORRESPONDENCE.

We shall be pleased to reply briefly and through this column to any seeking information or advice.

Replies demanding urgency will be promptly forwarded per post on receipt of stamped and addressed envelope. A post will be saved by addressing direct to Stanley Mount, Macclesfield.

This privilege does not of course extend to furnishing the solutions and answers of problems.

G. L. (Stockwell).—Try Hachette, King William Street, Strand.

X. L. N. T. (Somers Town, London).—It all depends upon the inspector. He can omit if he like.

B. M. (Bradford).—You may realise the same annual amount less the 10s. received from Government.

FREE EDUCATION (Brighton).—No school can be forced to admit a single free scholar, but if the necessary free accommodation be not provided, a Board School may be established close by.

T. P. C. (Aberystwith).—At present on vacation.

J. H. W. (Congleton).—See our Matriculation Class.

D. C. (Tring).—One guinea per annum, or a series of ten P.T. papers for half-a-guinea.

SMILE (Glasgow).—'La Jeune Sibérienne.'

P. G. L. (Tamworth).—The information was given in the July number.

ROW MAN (Norwich).—'*Id hoc facilius eis persuasit*' = '*Hoc persuasit eis id facilius*' = 'On this account he persuaded them [to do] this the more easily.' *Persuadeo* governs the dative of the person.

B. P. W. (Etruria).—Undoubtedly it was wrongly printed.

J. C. G. P. U. C. (Oban).—Gone, and left no address.

D. U. O. (Mottingham).—We should judge the Thames to terminate at the Nore, but no precise line can be drawn.

H. B. and U. C. (Belfast).—Natives of Ireland are eligible.

F. A. T. (Flint).—At present every consideration will be shown to schools introducing Drawing.

C. P. (Portsmouth).—After the October examination we shall give the routines in fuller detail.

J. W. (Toronto).—Your letter reached us too late for acknowledgment last month, but we fully reciprocate, although we fancy that many and great practical difficulties will intervene.

E. R. D. (Cheetham).—Having matriculated, your grammar and mathematics will require little attention; continue, however, your geography and school-management, &c.

RAILWAY (Chester).—Acting Teachers may take a language.

K. F. M. (St. Leonards).—At your school examination.

PUG (Langley), J. (King's Norton), Emily (St. Neots), Brutus (Winchester), S. L. and P. L. (Birmingham), CUT (Denbigh), C. S. (Castleton), MARS (Woolwich), U. S. (Pedmore), G. P. R. (Hull), D. J. (Llandyssil), J. A. T. (Uxbridge Common), J. A. (Overbigging, Orkneys), answered per ordinary letter.

(To be continued.)

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SCHOOL LAW.

BY G. E. GREEN, M.A.,

Whewell International Law Scholar, Cambridge University,

AND

F. L. GREEN,

Author of 'The Property of Married Women.'

CHAPTER III.

THE NEW EDUCATION ACT OF 1891.

Scope and Title.

The scope of the new Education Act of 1891 is fairly well indicated by its title, 'An Act to make further provision for assisting Education in Public Elementary Schools in England and Wales,' but the object of the Act is better shown by what will be its popular title, 'The Free Education Act.'

Fee Grant and its Conditions.

The first section of the new Act provides:

i. That after the commencement of the Act, there shall be paid out of moneys provided by Parliament, and at such times and in such manner as may be determined by regulations of the Education Department, a grant, called a fee grant, in aid of the cost of elementary education in England and Wales at the rate of ten shillings a year for each child of the number of children over three and under fifteen years of age in average attendance at any public elementary school in England and Wales (not being an evening school), the managers of which are willing to receive the same, and in which the Education Department are satisfied that the regulations as to fees are in accordance with the conditions in this Act.

ii. If in any case there is a failure to comply with any of the conditions in this Act, and the Education Department are satisfied that there was a reasonable excuse for the failure, the Department may pay the fee grant, but in that case shall, if the amount received from fees has exceeded the amount allowed by this Act, make a deduction from the fee grant equal to that excess.

iii. For the purposes of section nineteen of the Elementary Education Act, 1876, the fee grant paid or payable to a school shall be reckoned as school pence to be met by the grant payable by the Education Department.

It should be noted in this connection:

i. That public elementary schools within the meaning of this Act must, by section seven of the Education Act of 1870, observe the following regulations:—

(1) It shall not be required, as a condition of any child being admitted to or continuing in the school, that he shall attend or abstain from attending any Sunday school, or any place of religious worship, or that he shall attend any religious observance, or any instruction in religious subjects in the school or elsewhere, from which observance or instruction he may be withdrawn by his parent, or that he shall, if withdrawn by his parent, attend the school on any day exclusively set apart for religious observance by the religious body to which his parent belongs.

(2) The time or times during which any religious observance is practised, or instruction in religious subjects is given, at any meeting of the school shall be either at the beginning or at the end or at the beginning and the end of such meeting, and shall be inserted in a time table to be approved by the Education Department, and to be kept permanently and conspicuously affixed in every school room; and any scholar may be withdrawn by his parent from such observance or instruction without forfeiting any of the other benefits of the school.

(3) The school shall be open at all times to the inspection of any of Her Majesty's inspectors, so, however, that it shall be no part of the duties of such inspector to inquire into any instruction in religious subjects given at such school, or to examine any scholar therein in religious knowledge, or in any religious subject or book.

(4) The school shall be conducted in accordance with the conditions required to be fulfilled by an

elementary school in order to obtain an annual parliamentary grant contained in the minutes of the Education Department in force for the time being*.

ii. That the term 'Elementary School' means a school or department of a school at which elementary education is the principal part of the education there given, and does not include any school or department of a school at which the ordinary payments in respect of the instruction (*i.e.*, the weekly fee payable by the parent exclusive of payments for books, &c.) exceed ninepence a week. (Elementary Education Act, 1870, sec. 3).

iii. That the term 'Managers' includes all persons who have the management of any elementary school, whether the legal interest in the schoolhouse is or is not vested in them, and that school boards are the managers of all schools provided by them.

iv. That the term 'Education Department' means the Lords of the Committee of the Privy Council on Education.'

v. That section nineteen of the Elementary Education Act, 1876, enacts that after the 31st March, 1877, the conditions required to be fulfilled by an elementary school in order to obtain the annual parliamentary grant shall provide that:—

(1) Such grant shall not in any year be reduced by reason of its excess above the income of the school if the grant do not exceed the amount of seventeen shillings and sixpence per child in average attendance at the school during that year, but shall not exceed that amount per child, except by the same sum by which the income of the school, derived from voluntary contributions, rates, school fees, endowments, and any source whatever other than the parliamentary grant exceeds the said amount per child; and

(2) Where the population of the school district in which the school is situate, or the population within two miles, measured according to the nearest road, from the school is less than three hundred, and there is no other public elementary school recognised by the Education Department as available for the children of that district, or that population (as the case may be), a special parliamentary grant may be made annually to that school to the amount, if the said population exceeds two hundred, of ten pounds, and, if it does not exceed two hundred, of fifteen pounds; and

(3) The said special grant shall be in addition to the ordinary annual parliamentary grant, and shall not be included in the calculation of that grant for the purpose of determining whether it does or does not exceed the amount before mentioned in this section.

vi. That it is optional for the managers of a public elementary school to accept the fee grant or not, and that a refusal to accept the fee grant from the date at which the Act comes into force does not bar the managers from accepting it at a later date.

Limit of Fees in Schools receiving the Fee Grant.

Section two of the new Act provides:—

i. That in any school receiving the fee grant, where the average rate of fees received during the school year ended last before the 1st of January, 1891, was not in excess of ten shillings a year for each child of the number of children in average attendance at the school, or for which an annual parliamentary grant has not fallen due before the said 1st day of January, no fee shall, except as by this Act provided, be charged for children over three and under fifteen years of age.

ii. That in any school receiving the fee grant where the said average rate was so in excess, the fees to be charged for children over three and under fifteen years of age shall not, except as by this Act provided, be such as to make the average rate of fees for all such children exceed for any school year the amount of the said excess.

When the parent is to be charged no Fees.

By section three of the new Act, in any school receiving the fee grant, where the average rate charged and received in respect of fees and books and for other purposes during the school year ended last before the 1st January, 1891, was not in excess of ten shillings a year, for each child of the number of children in average attendance at the school, no charge shall be made to a parent in respect of any scholar.

It should be carefully noted in this connection:

i. That the ten shillings a year mentioned in this section covers books and other purposes as well as the actual school fee paid by the parent.

ii. That the term 'parent' bears the extended sense of 'guardian' and every person who is liable to maintain or has the actual custody of any child.

Power to modify the limit of Fees in certain cases.

Section four of the Act modifies the limit of fees. It provides:

i. That notwithstanding anything before contained in the Act, the Education Department, if they are satisfied that sufficient public school accommodation, without payment of fees, has been provided for a school district, and that the charge of school fees or the increase of school fees for children over three and under fifteen years of age in any particular school receiving the fee grant is required owing to a change of population in the district, or will be for the educational benefit of the district, or any part of the district, may from to time to time approve such charge or increase of fees in that school, provided that the ordinary fee for such children shall not exceed sixpence a week.

ii. That the Education Department shall report annually to Parliament all cases in which they have sanctioned or refused the imposition or augmentation of fees under this section, with a statement of the amount of fee permitted.

iii. That the Education Department may, if they think fit, make it an express condition of such approval that the amount received for any school year from the fees so charged or increased, or a specified portion of that amount, shall be taken in reduction of the fee grant which would otherwise have been payable for that school year, and in that case the fee grant shall be reduced accordingly.

Free School accommodation.

The fifth section of the Act deals with the question of school accommodation. It enacts:—

* See the Code of 1891.

That if at any time after the expiration of one year from the commencement of this Act it is represented to the Education Department that there is in any school district, or any part of a school district, an insufficient amount of public school accommodation without payment of fees for children over three and under fifteen years of age, for whom such accommodation is desired, and the Education Department are satisfied after inquiry that such is the case (which inquiry shall, on the request of the same persons as are entitled under section nine of the Elementary Education Act, 1870, to apply for a public inquiry, be a public inquiry if the district is under a school board) the Department shall direct the deficiency to be supplied in the manner provided by sections nine and ten of the Elementary Education Act, 1870, and every other section enabling them in that behalf, with respect to the supply of public school accommodation; and the expression public school accommodation in that Act shall include public school accommodation without the payment of fees.

Provided that whenever and so long as any deficiency in such last-mentioned public school accommodation in any district is in course of being supplied with due despatch, no requisition or order shall be issued in that behalf by the Education Department.

It should be noted that sections nine and ten of the Elementary Education Act, 1870, are to be read with this section.

Section nine of that Act provides (i) That the Education Department shall publish a notice of their decision as to the public school accommodation for any school district, setting forth with respect to such district the description thereof, the number, size, and description of the schools (if any) available for such district, which the Education Department have taken into consideration, and the amount and description of the public school accommodation, if any, which appears to them to be required for the district, and any other particulars which the Education Department think expedient. (ii.) That if any persons being either ratepayers of the district, not less than ten, or if less than ten being rated to the poor rate upon a rateable value of not less than one-third of the whole rateable value of the district, or the managers of any elementary school in the district, feel aggrieved by such decision, such persons may, within one month after the publication of the notice, apply in writing to the Education Department for, and the Education Department shall direct the holding of, a public inquiry in the manner provided by this Act. (iii.) That at any time after the expiration of such month, if no public inquiry is directed, or after the receipt of the report made after such inquiry, as the case may be, the Education Department may, if they think that the amount of public school accommodation for the district is insufficient, publish a final notice stating the same particulars as were contained in the former notice, with such modifications (if any) as they think fit to make, and directing that the public school accommodation therein mentioned as required be supplied.

Section ten goes on to say, That if after the expiration of a time, not exceeding six months, to be limited by the final notice, the Education Department are satisfied that all the public school accommodation required by the final notice to be supplied has not been so supplied, nor is in course of being supplied with due despatch, the Education Department shall cause a school board to be formed for the district, and shall send a requisition to the school board so formed requiring them to take proceedings forthwith for supplying the public school accommodation mentioned in the requisition, and the school board shall supply the same accordingly.

By section eleven, if the school board fail to comply with the requisition within twelve months after the sending of such requisition they shall be deemed in default. The Education Department may then by order declare the board in default, and by the same or any other order appoint any persons, not less than five or more than fifteen, to be members of such school board, and may from time to time remove any member so appointed and fill up any vacancy in the number of such members, whether caused by removal, resignation, death, or otherwise. After the date of the order of appointment, the persons who were previously members of the school board shall be deemed to have vacated their offices as if they were dead, but any such member may be appointed a member by the Education Department. The members appointed by the Education Department on the default of a school board may perform all the duties and exercise all the powers of a school board under the Education Acts, but they hold office during the pleasure of the Education Department, and when that Department considers that the default has been remedied and everything necessary for that purpose has been carried into effect, they may by order direct that members be elected for the school board in the same manner as in the case of the first formation of the school board.

Power to contribute from the fee grant to a common school fund.

Section six of the new Act provides:

That the managers of two or more public elementary schools in the same or neighbouring school districts, not being schools provided by a school board, may pay the fee grant, or part thereof, received by each school into a common fund for distribution, as may be arranged by them, between or among such schools.

Provided that the fee grant received by each school in the first instance shall alone count as income of such school for the purposes of this Act and of section nineteen of the Elementary Education Act, 1876, and a contribution to a school from any such common fund shall not be reckoned as income of such school from other sources within the said section nineteen.

Section nineteen of the Elementary Education Act, 1876, will be found under the heading 'Fee grant and its conditions.'

Grouping of Schools.

Section seven of the Act of 1891 contains some important provisions as to the grouping of schools. These are:

i. That where managers of two or more public elementary schools in the same or neighbouring school districts agree to associate and elect a committee for the schools, any surplus income on the accounts for the school year of any of the associated schools may be paid into a common fund, out of which contributions may be made to any of the associated schools.

ii. That the contributions received by any such school shall not be counted as income from other sources for the purpose of section nineteen of the Elementary Education Act, 1876, so that no addition to the public charge may result from this section taken in conjunction with the said section nineteen.

Provided that no board school shall under this section be associated with any public elementary school other than a board school.

Remission of Fees by School Board.

Section eight of the new Act explains section seventeen of the Elementary Education Act, 1870, thus:

Nothing in section seventeen of the Elementary Education Act, 1870, shall prevent a school board from admitting scholars to any school provided by the board without requiring any fee.

The section referred to says:

Every child attending a school provided by a school board shall pay such weekly fee as may be prescribed by the school board, with the consent of the Education Department, but the school board may from time to time, for a renewable period not exceeding six months, remit the whole or any part of such fee in the case of any child when they are of opinion that the parent of such child is unable from poverty to pay the same, but such remission shall not be deemed to be parochial relief given to such parent.

Provision for equality of treatment.

By section nine, nothing in the Elementary Education Act of 1891 shall give any preference or advantage to any school on the ground that it is or is not provided by a school board.

Meaning of terms 'School Year' and 'Average Attendance.'

In the new Act the expression 'school year' means a year or other period for which an annual parliamentary grant is for the time being paid or payable under the minutes of the Education Department; and the expression 'average attendance' for the purposes of the fee grant, means average attendance calculated in accordance with the minutes in force at the commencement of the Act.

Date of commencement of Act.

The Education Act of 1891 comes into operation on the 1st September, 1891.

Enactments repealed.

The passing of the new Act repeals section twenty-six of the Elementary Education Act, 1870, and section eighteen of the Elementary Education Act, 1876.

Section twenty-six of the Elementary Education Act, 1870, provided for the establishment of free schools in special cases. When a school board satisfied the Education Department that, on the ground of the poverty of the inhabitants of any place in their district, it was expedient for the interest of education to provide a school at which no fees were to be required from the scholars, the board might, subject to such rules and conditions as the Education Department might prescribe, provide such school, and might admit scholars to such school without requiring any fee.

Section eighteen of the Elementary Education Act, 1876, provided for the contribution for fees of children who had obtained certificates. Where a child under the age of eleven years had obtained such certificate of proficiency in reading, writing, and elementary arithmetic, and also such certificate of previous due attendance at a public elementary school as the Act mentioned in that behalf, then subject to the regulations and conditions contained in an order of the Education Department for the time being in force under the First Schedule to that Act, the school fee payable by such child at any public elementary school in the course of the three years next after he obtained the last of such certificates, not exceeding the ordinary fee charged at such school, might be paid by the Education Department out of moneys provided by Parliament, the school fees so paid being reckoned as school pence to be met by the grant payable by the Department.

Forthcoming Regulations of the Education Department with regard to the Fee Grant.

A circular recently addressed to School Boards and School Managers from the Education Department, Whitehall, says:—

'The regulations shortly to be issued by the Education Department will provide, *inter alia*, that the fee grant shall be paid by quarterly instalments, the final payment—which may under certain circumstances be for less than a quarter—being made together with, and at the same time as, the annual grant. These instalments will run from the 1st September, 1891, for those schools which at once come under the operation of the Act, and in other cases from the date—which must be the first day of the month—on which the school comes under the Act.

The instalments of the fee grant will be paid to the correspondent for the school, or if a Board School, to the treasurer of the School Board.'

PUBLICATIONS REVIEWED.

Royal Wall Maps: England and Wales. London and Edinburgh: T. Nelson and Sons.

This excellent wall map is essentially a new departure in respect to productions of this class. It possesses several features which, although perhaps not novel individually in themselves, form a novelty when taken in combination. It may be described as a Physical, Political, and Test map all in one; and although on first consideration it may appear well nigh impossible adequately to do justice to these three departments of Geography in one chart, there can be no doubt but that Messrs. Nelson have in the map before us effected an admirable combination, and produced a work which is a distinct gain to the educational equipment of the teaching profession. Without going too much into detail it may be said that, looking at the map as exponential of the physical features of the country, its graphical aspect is very striking—the mountains, in graduated brown tints, being represented as if rising in bold relief from the general surface of the country, which is tinted in different shades of green, varying from the full regen of the fens and low lying plains to the lighter tints of the more breezy uplands. As a political map, the boundaries of the various counties are indicated by red lines, and the positions of the different towns are distinctly shown by well defined and conspicuous dots of characteristic shapes. In order to adapt it for use as a test map, the names of all physical and political features are given in small type so as to be legible only to the teacher standing close by. A very capital feature is the division of the map into 100-mile squares—a system which will be generally acknowledged to be about the best possible for enabling young learners readily and intelligently to form an idea of the distances and areas concerned. Sections across the country, in various directions, are also given at the foot of the map, drawn in so bold a vertical scale as to emphasize very strongly the variations in height above sea level of the land surface between the points chosen.

In conclusion, and by way of summary, we may briefly and colloquially express our opinion of the map before us by saying that it will require a lot of beating.

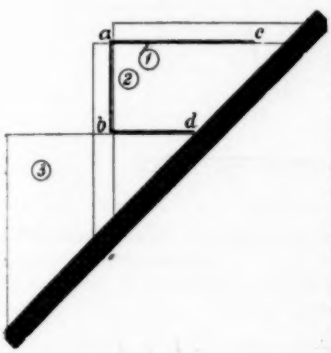
TEACHERS' NOTES OF DRAWING LESSONS FOR STANDARD IV.

By E. BUFFERY-RIDGE,

Art Teacher under the London School Board.

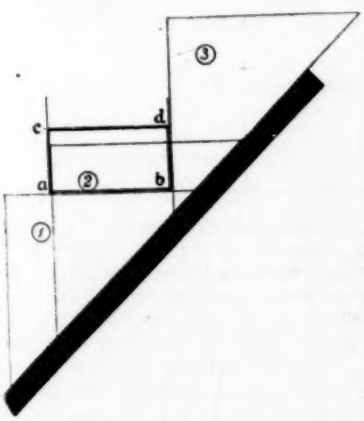
Drawing to Scale.—Standard IV.

Use of Set-Squares to obtain Perpendiculars and Parallels.—H pencils, india-rubber, set squares (the larger the better), rulers, with eighths and twelfths marked. Compasses:—Dividers are useful; pencil compasses give too much trouble in maintaining good points, and with clumsy points do much more harm than good. Straight slips of paper are better to measure with than the rulers when drawings to be copied are given.



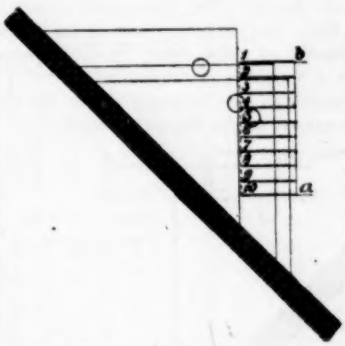
a b is a line one inch in length, and perpendiculars to it are wanted, one at each end of it. Place the set square touching the line so that the *square corner* is a little above *a*. Place the ruler against the slanting side of the set-square. Hold the ruler firmly, and slide the set-square down till the end *a* of the line is seen. Draw the line *a c*, it will be at right angles to *a b*. Still keep the ruler firm. Slide the set-square down farther till *b* is seen, and draw *b d*. This line also is perpendicular to *a b*, and *a c* and *b d* are parallel to each other.

Draw an Oblong or Rectangle 2 inches long and 1 inch wide.—A *Rectangle* is a figure the corners of which are right angles.



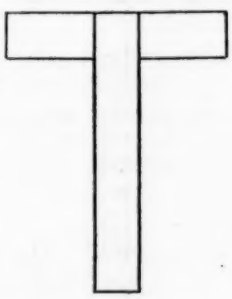
a b is the bottom line 2 inches long. Place the square against the line and the ruler against the square (1); slide the square up (2) and draw a perpendicular at *a*; slide the square up farther (3) and draw another perpendicular at *b*. Lay square and ruler aside while you make a mark *c* one inch from *a*. Then place the square and ruler again with the square touching *a b* and slide it up to *c*. Draw *c d*, which will be parallel to *a b*.

Draw ten parallel lines 1 inch long and ¼ inch apart.

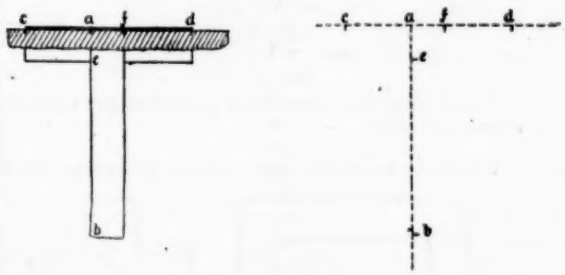


The dotted line is to start the others from and keep their ends level with each other. Mark on it 10 places a quarter of an inch apart. Place the set-square against the line with its right angle above No. 1. Use the ruler as before; slide the square down to (1), and draw a line as long as you want it; or if the square does not reach far enough, as long as you can. Then slide down to (2) and draw another line, then down to (3) and so on till ten lines have been drawn. Mark *a* on the tenth line one inch from the dotted line at the mark (10), place square and ruler as at first, and draw *a b* parallel to the dotted line, so as to level the ends of the ten lines and make them all of the proper length. Rub out everything but the ten equal and parallel lines.

Take a starting line in another position, and work the same again.



Copy this T square the same size.



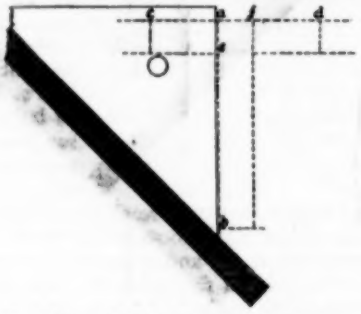
Draw the top line, and use the set-square to draw the left hand upright line, both without measuring but longer than you want them. Lay a strip of paper or the ruler on the copy, and make marks at *c*, *a*, *f*, and *d*.

Place the strip or ruler on your drawing with the mark *a* where the lines meet, and mark *c*, *f*, and *d*.

Place the strip by the upright line of the copy, mark *a*, *e*, and *b*, and do the same on your drawing. Then you will have a framework made up of two lines and all the measurements.

Place the set-square and ruler as shown, slide down, and draw a parallel to the top line at *e*. It may not be long enough, but do not stop for that, slide down to *b* and draw another, then lengthen the line through *e* if it is short. Use square and ruler again to draw perpendiculars down from *d*, *f*, and *c*.

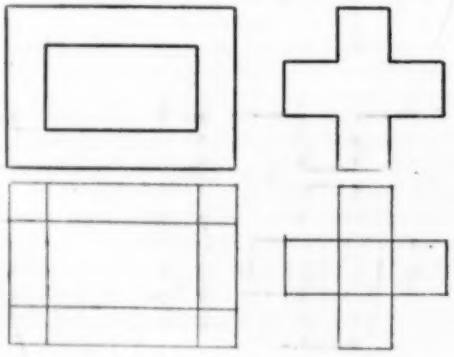
Clean out the pieces of line that are not in the copy, and rule carefully again over the lines that show.



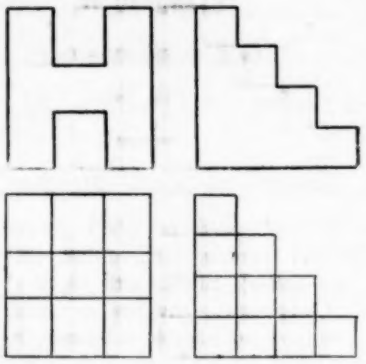
Twice the size. Begin in the same way but with longer lines. Take each measurement separately from the copy, that is, one distance at a time, and mark it *twice* on your drawing. *a f* twice makes *A F*, *a e* twice gives *A E*, *f d* twice reaches *F D*, *a c* twice is *A C*, and *e b* twice goes down to *B*. Finish as in the other drawing.

Three times the size. Mark each distance three times instead of twice.

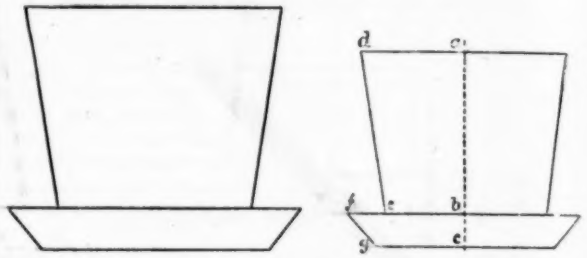
Figures to be copied once, twice, or three times the size.



Draw the lines right through as shown below, then rub out what is not wanted.



Figures which want centre-lines. Same size.



This drawing of a flower-pot and saucer has no upright side-lines on which measurements may be made; but a line down the middle will divide it into two equal halves, both sides being alike.

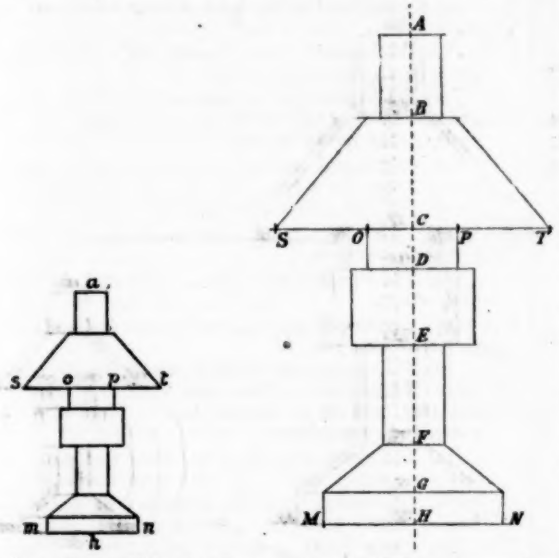
If a copy has no centre line draw one on it, if you are allowed to do so, as near as you can. For your own drawing start with top and centre lines any length. Take the upright measurements first down the centre line *a b* and *b c*. Then draw lines through *b* and *c* parallel to the top and at right angles to the middle line. Use square and ruler for this. Measure *a d* from the copy and mark it on both sides of *a* in your drawing. Do the same with *b e* and *e f* on each side of *b*, and *c g* on each side of *c*. Draw good lines where wanted, and rub out the rest. When you cannot use the centre line on the copy, put one in your drawing and work in the same way, but

obtain the middle of each line in the copy by measuring. In this way you would have to get *a d*, *b e*, and *c g*, but not *a b*, *b c*, or *e f*. Be very careful to get both sides exactly alike.

Before drawing this double the size work the next example.

Double the size.

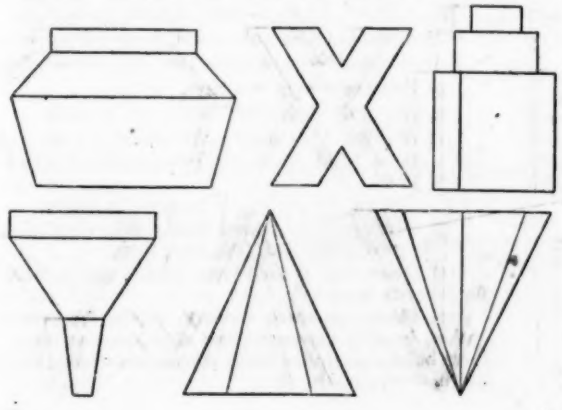
Draw a centre-line and mark on it *A B C D E F G H*, each distance twice the corresponding part of the copy. Draw horizontal lines at right angles to the centre line through each mark. In the copy measure *m n*, and put the same distance on each side of the centre-line of the drawing—that will be *H M* and *H N*. From *M* to *N* will be twice the width of *m n* in the copy. Measure all

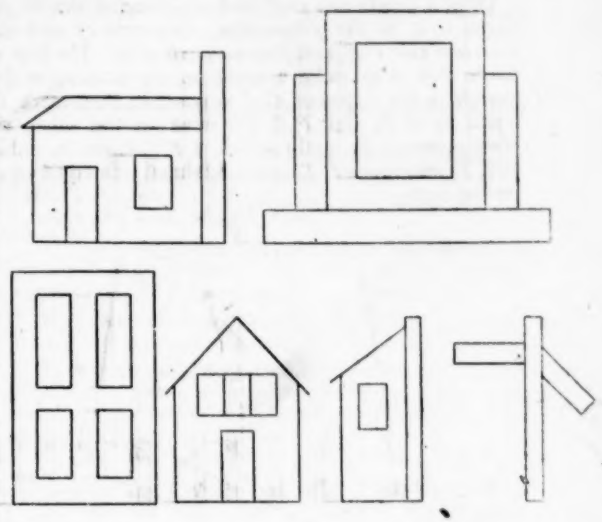


the other widths in the same way. Where more than one measurement is wanted on the same line, as at *o p*, *s t*, take *o p* first and mark it on each side at *C O* and *C P*, then take *S T* and mark *C S* and *C T*—in each case taking the *whole width* from the copy and placing it on each side of the drawing. No centre line is wanted in the copy.

Copy the previous example twice the size, then this the same size.

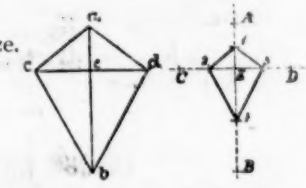
Other examples to be drawn same size and twice the size.





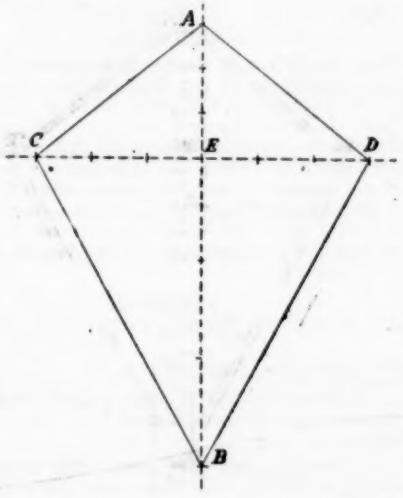
Copy the kite—

1. Three times the size.
2. Half the size.

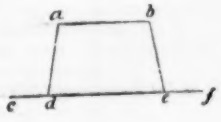


1. Draw *A B*, *C D*, at right angles to each other, and mark distances three times from *E*.

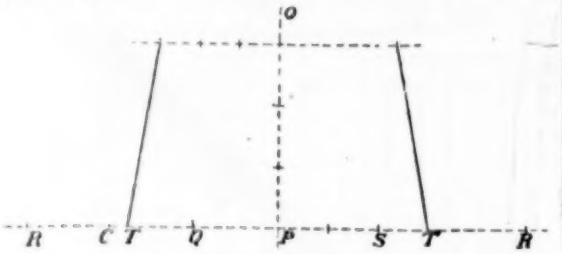
2. Mark in the same way each distance once, as if the drawing was to be the same size as the copy, then carefully mark the middle point of each length at 1, 2, 3, and 4, and draw the lines.



Copy the figure three times the size without putting a centre-line on the copy.



Draw a centre line *O P*, and a horizontal line at right angles to it for the bottom line. Measure *c f* and mark it on one side *C P*, and then add half of it. The best way to do this is to make a mark on the drawing at *Q*, as exactly in the centre of *C P* as possible, then mark *C R* equal to *C Q*, and *P R* the same on the other side. Next measure *d e*, and mark it at *P S*, halve it, add half at *S T*, and mark *P T* on the left-hand side equal to *P T* on the right.



Measure the height, and mark it up the centre line three times. Draw a horizontal for the top line. Measure *a b*, mark it on the drawing, halve it, add on half, and make the other side equal.

(To be continued.)

—o—

LONDON MATRICULATION.

JANUARY, 1892.

OUR PREPARATION CLASS FOR PRIVATE STUDENTS.

BY T. RUSSELL MALTBY, M.A. (CLASSICAL HONOURS),
Kingswood School, Bath.

(THIRD MONTH.)

WE hope to publish, in the October issue of *The Practical Teacher*, answers to all the Matriculation papers, set last June. Our readers will find small profit in their perusal, if they have not first themselves attempted the questions. We therefore advise them to make arrangements for their own examination,* and during the last days of September to answer the papers, or parts of papers, which fall within the course prescribed for January, consulting no books, observing the limits of time, and sparing no pains to make their papers neat and clear, such as the severest examiner would read with respect.

I. LATIN.

Notes on July Work.

Allen's Grammar, Sects. 149-153.

(1) There are about 360 simple verbs of the first conjugation, most of them formed from noun or adjective stems.

(2) *Poto* has perf. part. *potus*, with active meaning, *having drunk*, cp. (6). Distinguish *pŏtĕs* (possum) and *pōtēs* (poto).

(3) For compounds of *do*, see p. 111, and note the perfect of abscondo, *abscondi*. Distinguish *dĕdĕre* and *dēdĕre*.

For most of the passive forms of *vendo* and *perdo*, *vĕneo* and *pereo* are used.

(4) There are about 120 simple verbs of the second conjugation, most of them denoting *condition*, having nouns, adjectives, and inceptives in -sco, from the same roots.

(5) *Permaneo* is like *maneo*, but,—*emineo, eminui, no supine; immineo, no perf. no sup.; promineo, no perf. no sup.* Distinguish *mānĕ, wait thou*, and *mānĕ*, indecl. *morning; mānēs, mānēs* (mānāre), and *mānēs* (noun).

(6) *Prandeo* has perf. part. *pransus*, with active meaning.

(7) Like *sedeo* are *supersedeo*, and *circumsedeo*, other compounds change *e* to *i*, e.g., *possideo, possedi, possessum. Dissideo* and *praesideo* have no supine. Distinguish *-sīdes* and *-sides* (future, from sīdo, settle); *sĕdēs, thou sittest*, and *sēdes, a seat.*

(8) *Pendeo, I am hung up; pendo, I hang up, weigh.*

(9) Distinguish *nĭtens* and *nitens; vīres* and *vires* (noun).

(10) Distinguish *cŏmas* (noun) and *cōmas* (verb); *cōmēs* (noun) and *cōmēs* (verb).

(11) Distinguish all the forms of *dīco* (1st), *I dedicate*, and *dĭco* (3rd), *I tell;* of *ēdūco* (1st), *I train*, and *ēdŭco* (3rd), *I lead forth;* of *frĭgeo* (2nd), and *frīgo* (3rd).

(12) Distinguish *nūbēs, a cloud*, and *nŭbēs, thou wilt marry; rēgi, for a king*, and *rĕgi, to be ruled; scrībis, for scribes*, and *scrĭbis, thou writest.*

(13) Like *uro* are its compounds, except *comburo, combussi, combustum.*

(14) The compounds of *laedo, collido* and *allido*, have *-lisi, -lisum.*

(15) Distinguish *mīsĕrīs, for the wretched*, and *mīsĕrĭs, thou wilt have sent.*

(16) The compounds of *plecto, twine*, are deponents.

(17) Distinguish *occĭdens* and *occidens; cānēs, thou wilt sing*, and *cănēs, thou art hoary.* Note also *cānis, a dog*, and *cānus, hoary.*

(18) The compounds of *curro, disco*, and *posco* often retain the reduplication, *e.g., decucurri, edĭdici*, &c.

(19) Distinguish carefully all forms of *pario* (3rd), *I bring forth; pāro* (1st), *I prepare, pāreo* (2nd), *I obey.*

(20) *Condo* (3rd), *I build; condio* (4th), *I pickle; prŏdĭte, betray ye; prōdite, come ye forth.*

(21) *Sustuli* is used for the perfect of *tollo*, and *sustinui*, for the perfect of *suffero.*

(22) The verbs of the third conjugation in *-io* are—*capio, cupio, facio, fodio, fugio, iacio, pario, quatio, rapio, sapio, -cutio, -licio -spicio.*

(23) *Fŭgio* (3rd), *I flee; fūgo* (1st), *I put to flight.*

(24) The compounds of *iacio* ought to be spelled with one *i*, but pronounced as if there were two: *abicio* (*abyicio*).

(25) Note the forms of the various compounds of *lĕgo* and *rĕgo.* Distinguish *lēgo* and *lĕgo* (1st), *depute.*

(26) *Diffĭdit, he has cloven; diffīdit*, he distrusts.

(27) *Mandas* 1st or 3rd; *vellet*, from *vŏlo* or *vello.*

(28) *Prehendo* is often contracted into *prendo*, &c.

(29) Parse *vertere* in five ways.

(30 *Cŏlo* (3rd), *I cultivate; cōlo* (1st), *I strain.*

(31) *Mŏlītus*, from *mŏlo* (3rd); *mōlītus*, from *mōlior* (4th), *molis*, from *mŏla, millstone, mŏlo, I grind*, or *mōles, mass.*

(32) *Postum* for *positum* is frequent in poetry.

(33) Distinguish *texĕre* and *texēre; oblītus* and *oblĭtus; fĭde, by good faith*, and *fīde*, trust thou.

(34) *Quaero* has the old forms *quaeso* and *quaesumus* for 1st pers. pres. ind.

(35) There are about 60 verbs of the fourth conjugation, besides deponents and desideratives, many of them being descriptive verbs, *e.g., cucurio*, crow, *hinnio*, neigh, *tinnio*, tinkle, &c.

* The Supplement to *The Schoolmaster* (price 2d.) for June 27th, contains the papers.

(36) Parse *vēnit* (2), *vēnēre, vēniēre, vēnero, vĕnero.*

(37) *Operior, I am being covered; opperior, I am waiting for.*

(38) *-fessus,* from *-fateor* or *-fatiscor.*

(39) *Prŏfectus, having started; prōfectus, having been accomplished; prōfecto,* adv. *actually.*

(40) *Lăbor,* the noun; *lābor,* the verb. Compare forms of *lābōro* (1st).

(41) *Nixus* is generally used in the sense of *leaning, nisus* in the sense of *striving.*

(42) Distinguish *pătĕre, suffer thou,* and *pătēre, to lie open; ŭtī, as* or *that,* and *ūtī,* to use.

De Bello Gallico, V., 1–19.

(1) How was the Mediterranean Sea spoken of in Latin? What was the meaning of *mediterraneus* in classical Latin?

(2) What are the meanings of the following?—*Subductiones, actuarias, arbitros dare, litem aestimare, religionibus, vectoriis, taleis ferreis, plumbum album, vitro.*

(3) Have notes ready on *ad solis occasum,* et seq. (c. 8), *testudine* (c. 9), *aggere* (c. 9), *Gallicis aedificiis* (c. 12), *certis ex aqua mensuris* (c. 13).

Latin Course for September.

1. *Allen's Grammar, Sects. 154–163.* (Genders of Nouns, Notes on Declensions, Comparison of Adjectives, Anomalous and other Substantives.) Construct from these pages and your other reading, lists of nouns in six columns:—(1) Nom. S.; (2) Gender; (3) Meaning; (4) Abl. S.; (5) Gen. Pl.; (6) Other points, *e.g.*,—

Pelagus	n.	sea	pelago	pelagorum	n. and acc. pl. pelagē	
Orpheus	m.	Orpheus	Orpheo	v.s. -eu, acc. -eum, -ea	gen. -ei, -eos, dat. -eo, -ei	
Vates	m. f.	prophet	vate	vatum and vatium		
Cor	n.	heart	corde	wanting		

2. *Allcroft and Haydon, Sects. 110–151.*— Give special attention to Sects. 120–122 ('Place at which'). Commit the longer examples to memory. A further selection, admirably chosen, will be found in *Allen, Sects. 235—264.*

3. *Allcroft and Haydon, Exercises V., VI. and VII.*—75 sentences.

4. *De Bello Gallico V., Chapters 20–39.*—Proceed with the translation, making careful notes, and elaborating a written version.

5. *Translation at Sight.*—Make this the chief feature of the month's work in Latin. Instead of Cæsar, Book VI., take Miscellaneous Extracts (see *Practical Teacher* for July) in prose and poetry. Never write a word until you have read through the whole passage, and caught the general sense. Take about three half hours a week, and aim at speed as well as accuracy. During the last week take the Matriculation paper set in June, and, *under examination conditions,* translate the four extracts there given from 'books not prescribed. We shall publish versions in our October number.

II. GREEK.

Notes on August Work.

Abbott and Mansfield (Prepositions, The Regular Verb, Contracted Verbs).

(1) The meaning and use of prepositions must be learned from the lexicon. In general, the accusative with a preposition denotes that *towards* which, *over* which, *along* which, or *upon* which motion takes place; the genitive, that *from* which anything proceeds; the dative, *contact,* or that *in* which anything takes place.

(2) The meanings of prepositions *in composition* should be noted; these are given separately in the lexicon.

(3) The prepositions which govern three cases may be easily remembered thus:—

ἀμφί, ἐπί, μετά παρά,
περί, πρός, and ὑπό.

(4) The lists of Sect. 101 should be re-arranged and learned thus:—

Governing Gen.—14 Preps. (all except 4), viz., &c.
Also all *improper* Preps. like ἄνευ.
Governing Acc.—12 Preps. (all except 6), viz., &c.
Governing Dat.—10 Preps., viz., &c.

(5) ἀνά in most of its uses is exactly the opposite of κατά. It is only found with Gen. in the Homeric expression ἀνὰ ῥηὸς βαίνειν, *to go on board ship.*

(6) εἰς was originally the opposite of ἐκ. ὡς is used for εἰς with names of persons.

(7) The general ideas conveyed by ἐπί are (1) with Acc. *motion with a view to superposition,* (2) with Gen. *partial superposition,* (3) with Dat. *absolute superposition,* or *rest upon.*

(8) μετά with Acc. *after* (in space or time); with Gen. *with* (Lat. *cum*); with Dat. (in poetry) *among.*

(9) παρά well illustrates the rule above (1). With Acc. *to the side of;* with Gen. *from the side of;* with Dat. *at the side of.* So ὑπό (*under*) with the three cases. Also, ὑπό with Gen. denotes *the agent.*

(10) The best way to retain λύω after the tenses have been thoroughly mastered is the constant repetition of 'paradigms,' thus:—

Weak aor. Act.

ἔλυσα-λῦσον, λύσω, λύσαιμι, λῦσαι, λύσας.

(11) Note the forms distinguished only by the accent, *e.g.*, λῦσαι (Opt.), λῦσαι (Inf. or Imp.)

(12) In Sect. 114, πέπλεγ-μαι is for πεπλεκ-μαι (Sect. 21); πέπλεχθον is for πεπλεκ-θον (Sect. 21) = πεπλεκ-σθον (*); πέπεισμαι is for πεπειθ-μαι (Sect. 21); πέπει-σαι for πεπειθ-σαι (Sect. 113); πέπεισ-ται for πε-πειθ-ται (Sect. 113); πέπεισ-θον for πεπειθ-σθον (Sect. 114 and *); τέτυμμαι for τετυπ-μαι (Sect. 21); τέτυψαι for τετυπ-σαι; τέτυφθον for τετυπ-σθον (Sect. 21 and *) ἔσπαρθον for ἐσπαρ-σθον (*).

* *In passive and middle endings, σ is dropped between two consonants.*

Greek Course for September.

1. *Abbott and Mansfield, Sects. 122-125* (Augment), *126-128* (Reduplication), *147-154* (Verbs in -μι). The last-mentioned sections must be thoroughly learned, whatever the cost.

2. *Merry's Sketch of Principal Homeric Forms, Sect. 23* (Verbs in -μι).

3. *Odyssey IV., 155-331.* Translate as before. The pace ought now to be much quicker, leaving time for regular practice in

4. *Translation at Sight.* At least two extracts a week. See the remarks above on Latin Unseens. In the examination there will probably be a prose-passage and a verse-passage. A vocabulary of the more difficult words is supplied. The passages from Xenophon set last time might also be attempted at sight and compared with the translations which we shall publish in October.

FRENCH.

Notes on August Work.

Breymann, to the end of Weak Verbs.

(1) *Haïr, to hate,* is the only verb which has not a circumflex in 3rd sing. imperf. subj.

(2) Before a *perfect* infinitive *ne...pas, ne...point,* &c., may or may not be separated.

(3) Note specially Sect. 81. ('Reflective verbs are conjugated with *être.*')

(4) Distinguish *récréer, recreate*, and *recréer, create anew; réformer, reform*, and *reformer, form anew*, &c.

(5) Distinguish *répare, repare, répars, repars.*

(6) Distinguish *paraît* (*parer*), and *paraît* (*paraître*).

(7) Distinguish *dénier* (verb), and *denier* (noun).

(8) Distinguish *présentant, pressentant, pêcher* and *pêcher, différent* and *different* (verb).

(9) Give the 3rd plur. imperf. ind. and pres. subj. of *allier, prier, rire.*

(10) Give pres. part. of *lier*, and *lire;* pret. def. of *peigner* and *peindre;* pres. ind. of *libérer, malmener, parsemer.*

(11) Give examples of the varying meanings of *accourir, descendre, expirer, passer*, &c., as they are conjugated with *avoir* or with *être.*

French Course for September.

1. *Breymann's Grammar, pages 49 to 98.* (Strong verbs.) Compare these formations with the Table, p. 21.

2. *Matriculation French Papers, IX. to XI.* (see July *Practical Teacher*), and the *three* passages set last June.

3. *Rapid Translation*, as before. The passages selected should be of increasing difficulty.

4. *Word-lists and Phrase-lists*, as before. Revise July and August lists.

III. ENGLISH.

Notes on August Work.

Beach, pp. 53–97.

(1) The Tense-System is somewhat summarily dealt with in *Beach.* It should be noted—(1) that there are twelve tenses, viz., four presents, four pasts, and four futures, (2) that the usual terms for each in these fours are *Indefinite, Imperfect, Perfect, Perfect and Continuous*, (3) that these tenses are to be found in the Subjunctive, as well as the Indicative, and in the Passive, as well as the Active. Thus the full conjugation of *love* is much more extensive than the forms on pp. 64-68. *Mason* is good on the Tenses. Prepare a comparative table of tenses in English, Latin, and Greek or French.

(2) Careful attention should be given to Defective Verbs, their history, forms, and usage, *e.g.*, the two uses of *have*, and the expression *I have to go.* On all these verbs (*have, be, do, will, shall, may, must, can, ought, dare, wit*) complete information will be found in *Hewitt and Beach*, pp. 176-195. Why is there no *-s* in the 3rd sing. of most of the above?

(3) How did the conjugation of an A.-S. verb differ from that of a modern English verb?

(4) 'Principal parts' cannot conveniently be learned from a Dictionary. *Hewitt and Beach* give good lists with the Anglo-Saxon forms (pp. 153-167). *Mason's* classification also is worth study. Why is *feed* a weak verb? What is the origin of the termination *-ed?* Account for the vowel-change in strong verbs.

(5) Prepare *full* definitions of all the Moods. The history of the infinitive with *to*, and that of the gerund in *-ing* require prolonged study. On the latter, *Mason* is very complete. Learn the list of verbs followed by infinitive without *to*,—*may, can, must, dare, let, do, shall, will, bid, make, see, hear, feel, need.*

(6) Make a thorough study of all the uses of *as* (see H. and B's. Index), and parse conjunctive adverbs from time to time.

(7) Tabulate the adverbs formed from the roots of *who, the, he.*

(8) Why are many adverbs the same in form as adjectives?

(9) Concerning *Prepositions* there are several important questions, *e.g.*, the growth of the prepositional use of participles, the adverbial origin of prepositions (*Beach*, p. 87), and above all the history of the meanings of all the chief prepositions. The last is a long piece of work, but London candidates must not shirk it. It is well treated in *Mason;* also in *H and B., pp. 222-235.*

(10) *Conjunctions* (pp. 91-94) should also be classified thus:—A. Co-ordinative: 1. Simple, 2. Adversative, 3. Alternative. B. Subordinative: 1. Simple, 2. Temporal, 3. Causal, 4. Hypothetical, 5. Concessive, 6. Alternative, 7. Comparative.

(11) Trace the development of the demonstrative *that*, of the adverb *than*, and of the prepositions *after, for*, &c., into conjunctions.

(12) How are Connective Adverbs to be distinguished from Conjunctions?

(13) Prepare the etymology of *and, both, either, or, if, lest, unless, but.*

(14) Get up all the usages of *but* and *than* (see Index of H. & B.).

(15) *Interjections* present some interesting derivations.

English Course for September.

1. We would again remind our readers that the London questions on the English Language take a wide range, and it is necessary that the preparatory reading should not be confined in any way. With this reminder, we give for the month *Beach, pp. 98 to 145* (Syntax).

2. *Prosody* (*Beach, pp. 202 to 208*), with first practice in determining metres.

3. *English History* (*Ransome*), *1399 to 1603, with the Geography relating thereto.*

IV. MATHEMATICS.

Course for September.

1. *Arithmetic.—Capel's Handbook, Part V.* (*Ratio and Proportion*) and *Catch-Questions, Chapters XI. to XX.* Much of this will be matter over which our readers need not spend much time. Note, however, in the latter book XI. 10, and XVII. 2 (Properties of Numbers in Proportion), XVI. (Discount and Present Worth), and XVIII. (Compound Interest). Choose difficult and *tedious* exercises for practice, and work out questions actually set in London papers.

2. *Algebra.—Capel's Handbook, Chapters XXIII. to XXVIII.* (*Highest Common Factor, Least Common Multiple, Fractions*). Note Sect. 219 ('discard factors in G.C.M.'), Sects. 222-228 (proof the operation for finding H.C.F.), Sect. 232 (L.C.M. of two expressions is equal to their product divided by their H.C.F.), and in particular Sects. 235-242, 247-250 (proofs of the various operations in fractions), Chapter XXVIII. is a very useful one, dealing with the large class of questions introduced thus:—

If $\frac{a}{b} = \frac{c}{d}$, prove that . . . .

Prepare a list of *general formulæ* to be known perfectly, including even such results as $(a + b + c)^3 - a^3 - b^3 - c^3 = 3(a + b)(b + c)(c + a)$.

3. *Geometry.—Hall and Stevens' Euclid, pp. 121-143* (*Book II.*) *with Exercises interspersed*, and *pp. 149 to 182* (*Book III., 1 to 19*), *with Exercises.*

V. MECHANICS.

Course for September.

Magnus, Chapter VI. (Machines), *and complete revision of Chapters I. to VI.* (Kinematics and Dynamics).

VI. CHEMISTRY.

Course for September.

Morris's Class Book, pp. 54 to 67 (Chlorine, Hydrochloric Acid, Bromine, Iodine, Fluorine). Read widely.

HEAT AND LIGHT.

Course for September.

Wallace Stewart, Chapters VIII. to X. (Vaporization and Condensation, Hygrometry, Conduction, and Convection.)

QUERY.

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3. How many miles are there in five hundred and six thousand eight hundred and eighty inches?
4. If I buy a gross of oranges @ two for 1½d. and sell them at a penny each, how much do I gain?

Card 5.

1. Divide seventy thousand and seven pounds seventeen shillings and fourpence halfpenny by seventy-eight.
2. Reduce 80,706 sq. ft. to acres, roods, &c.
3. Find the product of sixty-seven pounds thirteen shillings and sixpence three farthings and six hundred and ninety-five.
4. How many heaps of money, each containing a half-crown, a florin, a shilling, a sixpence, and a penny, can be made out of £37 8s. 3d.?

Card 6.

1. What is the 379th part of eight thousand seven hundred and nine pounds twelve shillings and sixpence halfpenny?
2. Reduce two hundred and one thousand three hundred and fifty-nine seconds to days, hrs., &c.
3. Multiply eight hundred and three pounds fifteen shillings and ninepence halfpenny by 97.
4. A cistern holds 370 gallons. A man goes 4 times a day to it with a bucket holding 2½ gallons. How much is left at the end of 15 days?

Card 7.

1. Multiply seven hundred and sixty-five pounds nine shillings and tenpence farthing by 109.
2. Divide thirty-two thousand three hundred and ninety pounds one shilling and sixpence three farthings by two hundred and ninety-five.
3. Bring 4,863 ounces to quarters, &c.
4. A man earns £2 7s. 6d. per week. He spends 30s. for food, and 5s. 9d. for lodgings. How much does he save in thirteen weeks?

Card 8.

1. Multiply four hundred and sixty pounds seventeen shillings and a farthing by eighty-three.
2. £33,044 10s. 0¾d. ÷ 57.
3. In a piece of chain there are 1,440 links, each 3½ inches long. How many fathoms are there? (6 feet = 1 fathom.)
4. A farmer sells 8 sheep at £4 7s. 6d. each, and 9 pigs at £3 6s. 8d. each. He then buys 4 cows and finds he has £5 left. How much did each cow cost?

Card 9.

1. A grocer mixes 15 lbs. of sugar at 4d. per lb. with 5 lbs. at 6d. per lb. What is the price of the mixture per lb.?
2. Divide thirty-six thousand eight hundred and seven pounds three shillings and a penny farthing by 74.
3. How many miles, &c., are there in eight hundred and five thousand four hundred and thirty-two inches?
4. £85 10s. 11¾d. × 85.

Card 10.

1. Find the amount that is two hundred and forty-six times £1,097 18s. 3¼d.
2. Divide thirty-nine thousand six hundred and seven pounds eighteen shillings and fourpence halfpenny by eighty-seven.
3. How many yards of telegraph wire would be required to stretch from Calais to Dover, a distance of 21 miles?
4. In a box of 6000 screws 9 out of every quarter of a hundred are bad ones. How many bad ones are there altogether?

Card 11.

1. Reduce 15 cwt. 3 qrs. 15 lbs. 14 ozs. 12 drs. to drams.
2. How many coins, each worth 2s. 4½d., are worth £231 16s.?
3. Find the difference in yards between 22 mls. 3 fur. 25 po. and 21 mls. 5 fur. 30 po. 2 yds.
4. If a shot from a gun travels at the rate of 400 yds. in a second, how long will it take it to go 25 miles?

Card 12.

1. A horse and cart cost £112. The horse cost three times as much as the cart. What was the value of the horse?
2. Multiply four thousand seven hundred and six pounds eighteen shillings and elevenpence halfpenny by 99.

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3. Bring 1½ acres to square inches.
4. Divide eighty-seven thousand four hundred and three pounds fifteen shillings and sevenpence halfpenny by two hundred and eighty-seven.

Card 13.

1. Divide £101,007 10s. 0¾d. by 94.
2. How many pints of wheat are there in 19 qrs. 3 bus. 3 pks.?
3. Multiply two hundred and sixty-eight pounds four shillings and elevenpence farthing by eighty-four.
4. A woman gets £14 10s. 3d., and three girls get £3 15s. 9d., 17s. 6d., and 16s. 6d. After paying these sums what would be left out of £20?

Card 14.

1. Multiply thirteen shillings and eightpence farthing by four hundred and sixty-nine.
2. Divide £564 0s. 11¼d. by 573.
3. How many minutes are there in the first two months of a leap year?
4. A man bought 480 oranges at 6d. per score and sold them at 8d. per dozen. What did he gain?

Card 15.

1. How many sq. feet are there in three acres and a half?
2. Multiply seven hundred and eighty-nine pounds seventeen shillings and eightpence three farthings by 117.
3. Reduce 27 qrs. 3 pks. 3 qts. to pints.
4. How much have I left out of £50 if I pay 39 men 3s. 6d. each, and 27 women 2s. 9d. each?

Card 16.

1. Reduce 7 furlongs to inches.
2. Divide six hundred and seventy-eight pounds nineteen shillings and fourpence halfpenny by forty-five.
3. Multiply £2 17s. 6d. by 997.
4. A picture and frame cost 50 guineas. The picture cost twice as much as the frame. Find the cost of the picture.

Card 17.

1. Divide eight thousand and four pounds fourteen shillings and three halfpence by seventy-one.
2. Multiply ninety-five pounds four shillings and threepence halfpenny by 43.
3. Find how many half-ounces there are in a ton.
4. If three pennies weigh one ounce, what will £12 worth of pennies weigh in pounds?

Card 18.

1. In 740,319 drams how many stones, &c., are there?
2. Multiply seventy-five pounds eighteen shillings and fourpence three farthings by three hundred and twenty-seven.
3. Divide five thousand seven hundred and ninety pounds thirteen shillings and fourpence by 97.
4. A pinafore is 1¼ yds. long. How many pinafores can I get out of 131¼ yds.?

Card 19.

1. Multiply twenty-four pounds nineteen shillings and ninepence farthing by 163.
2. How many furlongs, &c., are there in ten thousand nine hundred and twenty-nine feet?
3. A flock of 860 sheep is sold for thirteen hundred and sixty-seven pounds and tenpence. Find the price of each sheep.
4. A wine merchant bought 104 gallons of wine for £93, and mixed it with 48 gallons for £53 18s. 8d. What must he sell it at per gallon so as to neither gain nor lose?

Card 20.

1. Multiply £192 14s. 8¾d. by 153.
2. Divide four thousand nine hundred and eighty-four pounds by 128.
3. Reduce eight hundred and fifteen thousand and ninety minutes to days, &c.
4. I bought 1 ac. 1 ro. of land for £180. After spending £10 15s. in draining it, I sold it at £25 per rood. What was my loss?

Card 21.

1. Reduce 609,018 feet to quarter inches.
2. Divide three thousand six hundred and four pounds by three hundred and eighty.
3. A man gave a ten pound note for some pigs at thirty shillings each. He had a sovereign change. How many pigs did he buy?
4. Multiply seven hundred and six pounds nineteen shillings and a farthing by 179.

Card 22.

1. Divide eight thousand and eighty-four pounds ten shillings and fourpence three farthings by 317.
2. Reduce 605,015 ounces to tons, &c.
3. What is the difference between 2,975 half-crowns and 5,083 florins?
4. How much does a man save out of an annual income of 530 guineas, if he spends £9 17s. 9¼d. weekly?

Card 23.

1. If 738 horses cost £5,602 13s., what would one cost?
2. Multiply seventeen shillings and tenpence three farthings by 658.
3. Reduce 15 yrs. 16 wks. 29 min. to minutes, reckoning 52 weeks = 1 year.
4. A man bought eleven sheep and six cows for £149 10s. The sheep cost him 30s. each; what was the price of a cow?

Card 24.

1. Divide £593,274 13s. 9½d. by 579.
2. How many square inches are there in 2¼ acres?
3. Bring 63,852,739 inches to chains, &c.
4. If a lesson in school lasts for 35 minutes and there are four such lessons a week, what tuition in that subject will a boy receive monthly?

Card 25.

1. Multiply nine thousand and eighty-three pounds and tenpence farthing by 537.
2. Reduce 2 tons 3 qrs. 17 lbs. to ounces.
3. Divide £75,405 17s. 1d. equally among 190 persons.
4. A man agrees to take 500 dollars in payment of a debt of £100. If each dollar is worth 4s. 2¼d., how much will he gain or lose?

Card 26.

1. Divide £95,415 2s. 3½d. by 175.
2. How many miles, &c., are there in one hundred and eight thousand four hundred and eleven feet?
3. What sum is 207 times £7,017 13s. 7¾d.?
4. A grocer received 10 boxes of fruit each weighing 1½ cwt. If the boxes when empty weighed 30 lbs. each, how many lbs. of fruit did the grocer receive?

Card 27.

1. A man owned 12 horses and 50 cows. The whole were worth £1,102 10s. Each horse cost 25 guineas. What was the cost of each cow?
2. Reduce 25,000 tons to ounces.
3. A soldier earns 1s. 3d. per day. What will a regiment of 850 soldiers earn weekly?
4. A clock ticks once a second. How many times will it tick in 7 days 4 hrs.?

Card 28.

1. How many half-ounces are there in 201 tons?
2. A person bought herrings at 2s. 6d. per hundred and sold them at 2 a penny. What did he gain on a thousand?
3. Multiply four thousand seven hundred and thirty-nine pounds seventeen shillings and elevenpence farthing by 390.
4. A railway is 850 miles long and cost in making £118,790 3s. 1½d. What was the cost per mile?

Card 29.

1. Multiply fifty-seven pounds nine shillings and eightpence three farthings by sixty-eight.
2. Divide six thousand seven hundred and seventeen pounds eighteen shillings and elevenpence halfpenny by 83.
3. How many poles, &c., are there in 436,720 inches?
4. A dealer bought 18 tons of coal at 17s. 6d. per ton. He sold them at thirteen pence per cwt. How much did he gain?

Card 30.

1. A servant's wages are £18 a year. How much money can she save in 3 years, if she spends thirteen pence every week for washing, and £9 18s. 6d. yearly on other things?
2. How many acres, &c., are there in nine hundred and eighty-four thousand four hundred and thirty sq. inches?
3. Divide £79,097 18s. 0½d. by 79.
4. How much is one hundred and six times £87 19s. 11½d.?

Card 31.

1. Reduce 1 sq. mile 3 ro. 3 sq. yds. to sq. ft.
2. Multiply six hundred and seventy pounds eleven shillings by six hundred and ninety.
3. Divide two hundred and forty-nine thousand seven hundred and forty pounds seven shillings and elevenpence by two hundred and seventy.
4. John saved a penny a day, and James 6d. per week. How much had each at the end of three years, none being a leap year?

Card 32.

1. Divide £600 and half-a-crown by seventeen.
2. Multiply seventeen shillings and tenpence halfpenny by nine hundred and fifty.
3. Bring fifty thousand and fifty halfpence to pounds, &c.
4. A gentleman gave 32 boys 12s. each, and 48 girls 3 times as much each as a boy. How much money did he give away?

Card 33.

1. Reduce 3 acres 3 roods to sq. feet.
2. Divide seventeen pounds seventeen shillings and sevenpence halfpenny by 94.
3. What is 905 times three hundred and seventy-seven pounds seventeen shillings and sevenpence halfpenny?
4. How much is left out of £12 after paying 39 men 3s. 6d. each, and 27 women 2s. 6d. each?

Card 34.

1. Multiply sixty-two pounds thirteen shillings and threepence halfpenny by 35.
2. Divide eight thousand and four pounds eleven shillings and a penny three farthings by seventy-one.
3. Reduce a ton to quarter-ounces.
4. How many yards of calico at 3½d. per yard can I buy for thirty shillings and fourpence?

Card 35.

1. Multiply ninety-five pounds fourteen shillings and threepence by forty-five.
2. Divide six hundred and seventy-eight pounds nine shillings and fourpence halfpenny by forty-eight.
3. How many sq. yds., &c., are there in 19,872 sq. inches?
4. If 3 pennies weigh one ounce, what is the value of pennies weighing 127½ lbs.?

Card 36.

1. Multiply eight hundred and forty-nine pounds nineteen shillings and eightpence three farthings by five hundred and eighteen.
2. Find the 495th part of four hundred thousand three hundred and ninety pounds and sevenpence halfpenny.
3. Reduce 84 tons 13 cwt. 84 lbs. to stones.
4. The circumference of a wheel was 5 ft. 5 in. How often would it turn round in going 65 miles?

Card 37.

1. Divide seven hundred thousand and forty pounds seventeen shillings and a halfpenny by 364.
2. Reduce six hundred and fifty-five thousand one hundred and ninety-seven feet to furlongs, &c.
3. Bring half-a-million quarts to quarters, &c.
4. In a school of 500 children, half paid 3d. a week and the rest 2d. What school fees were taken in a month of 4 weeks?

Card 38.

1. Multiply seventy-six pounds fifteen shillings and three farthings by ninety-nine.
2. Divide one hundred thousand and sixty pounds seventeen shillings and a farthing by two hundred and seventy-five.
3. Bring three-quarters of a million ounces to tons, &c.
4. A penny is three inches in circumference. How many times will it turn round if rolled a distance of 1 pole 5 yds.?

A Prize of HALF-A-GUINEA will be paid to the Teacher who is

LOND

Card 39.

1. Multiply six pounds and elevenpence farthing by one hundred and sixteen.
2. Divide one hundred thousand and ninety pounds nineteen shillings and sevenpence by 198.
3. How many half-pints are there in 54 galls. 1 qt. 1 pt.?
4. A man's wages are £96 a quarter. He saves thirty-five shillings a week. How much does he spend in a year?

Card 40.

1. Multiply eight pounds thirteen shillings and sixpence by 780.
2. Divide one hundred and ten pounds ten shillings by eighty-five.
3. How many minutes are there in 350 days 6 hrs.?
4. A man bought 8 bullocks at £13 each, and kept them for 6 weeks, costing him 2s. 6d. each weekly. What did he lose by selling them for £100?

ANSWERS.

Card 1.

1. £17,393,924 0s. 2½d.
2. 468,441 sq. ft.
3. £182 0s. 10¾d.
4. 22½ hrs.

Card 2.

1. £91 15s. 10¼d. + 44 q.
2. 195 qrs. 2 bus. 2 pks. 1 gal. 2 qts.
3. £6,235 17s. 9d.
4. 2 mls. 4 fur. 18 po. 1 yd.

Card 3.

1. 227,920 yds.
2. 757 fur. 5 chains 16 yds. 2 ft.
3. £14,381 10s. 9½d.
4. £37,008 6s. 11¾d.

Card 4.

1. £400 1s. 5¾d.
2. £5,802 19s. 11¼d.
3. 8 miles.
4. 3s.

Card 5.

1. £897 10s. 8¾d. + 24 q.
2. 1 ac. 3 ro. 16 po. 13 yds. 3 ft.
3. £47,036 5s. 11¼d.
4. 123 heaps.

Card 6.

1. £22 19s. 7¼d. + 123 q.
2. 2 days 7 hrs. 55 min. 59 sec.
3. £77,967 11s. 9½d.
4. 220 gallons.

Card 7.

1. £83,438 14s. 1¼d.
2. £109 15s. 11½d.
3. 10 qrs. 23 lbs. 15 oz.
4. £7 12s. 9d.

Card 8.

1. £38,250 12s. 8¾d.
2. £579 14s. 6¾d.
3. 70 fathoms.
4. £15.

Card 9.

1. 4½d. per lb.
2. £497 7s. 10½d + 17 q.
3. 12 mls. 5 fur. 27 po. 4½ yds. 4 in.
4. £7,271 13s. 2¾d.

Card 10.

1. £270,086 14s. 7½d.
2. £455 5s. 3d. + 78 q.
3. 36,960 yds.
4. 2,160 screws.

Card 11.

1. 455,660 drams.
2. 1,952 coins.
3. 1,290½ yds.
4. 1 min. 50 sec.

Card 12.

1. £84.
2. £465,987 16s. 10½d.
3. 9,408,960 sq. in.
4. £304 10s. 10¼d. + 23 q.

Card 13.

1. £1,074 10s. 11¼ + 93 q.
2. 9,968 pints.
3. £22,532 14s. 9d.
4. Nothing.

Card 14.

1. £320 19s. 5¼d.
2. 19s. 8¼d.
3. 86,400 minutes.
4. 14s. 8d. gain.

Card 15.

1. 152,460 sq. feet.
2. £92,416 14s. 3¾d.
3. 13,878 pints.
4. £39 9s. 3d.

Card 16.

1. 55,440 inches.
2. £15 1s. 9d. + 30 q.
3. £2,866 7s. 6d.
4. £35.

Card 17.

1. £112 14s. 10d. + 46 q.
2. £4,094 4s. 6½d.
3. 71,680 half oz.
4. 60 lbs.

Card 18.

1. 206 st. 7 lbs. 13 oz. 15 drs.
2. £24,825 15s. 5¼d.
3. £59 13s. 11¼d + 67 q.
4. 105 pinafores.

Card 19.

1. £4,073 2s. 7¾d.
2. 16 fur. 22 po. 2 yds.
3. £1 11s. 9½d.
4. 19s. 4d.

Card 20.

1. £29,488 13s. 6¾d.
2. £38 18s. 9d.
3. 566 days 50 min.
4. £65 15s.

Card 21.

1. 29,232,864 qr. in.
2. £9 9s. 8d. + 80d.
3. 6 pigs.
4. £126,544 4s. 8¾d:

Card 22.

1. £25 10s. 0¾d. + 28 q.
2. 16 tons 17 cwt. 2 qrs. 13 lbs. 7 oz.
3. £136 8s. 6d.
4. £42 5s. 11d.

Card 23.

1. £7 11s. 10d.
2. £588 15s. 5½d.
3. 8,023,709 min.
4. £22 3s. 4d.

Card 24.

1. £1,024 13s. 0¾d. + 509 q.
2. 14,113,440 sq. in.
3. 80,622 ch. 3 yds. 7 in.
4. 9 hrs. 20 min.

Card 25.

1. £4.877,593 18s. 8¼d.
2. 73,296 ounces.
3. £396 17s. 5½d.
4. £4 13s. 9d. gain.

Card 26.

1. £545 4s. 7d. + 10 q.
2. 20 mls. 4 fur. 10 po. 2 yds.
3. £1,452,660 4s. 8¼d.
4. 1,380 lbs.

Card 27.

1. £15 15s.
2. 896,000,000 ounces.
3. £371 17s. 6d.
4. 619,200 times.

Card 28.

1. 14,407,680 half oz.
2. 16s. 8d.
3. £1,848,559 15s. 7½d.
4. £139 15s. 0¾d.

Card 29.

1. £3,909 1s. 7d.
2. £80 18s. 9¼d. + 47 q.
3. 2,205 po. 3½ yds. 4 in.
4. £3 15s.

Card 30.

1. £15 15s. 6d.
2. 25 po. 2¾ sq. yds. 5 ft. 46 in.
3. £1,001 4s. 9¼d. + 54 q.
4. £9,327 15s. 7d.

Card 31.

1. 27,911,097 sq. ft.
2. £462,679 10s.
3. £924 19s. 3¼d. + 230 q.
4. John £4 11s. 3d., James £3 18s.

Card 32.

1. £35 6s. 0¼d. + 7 q.
2. £849 1s. 3d.
3. £104 5s. 5d.
4. £105 12s.

Card 33.

1. 163,350 sq. ft.
2. 3s. 9½d. + 58 q.
3. £341,982 10s. 7½d.
4. £1 16s.

Card 34.

1. £2,193 5s. 2½d.
2. £112 14s. 9½d. + 45 q.
3. 143,360 qr. oz.
4. 104 yds.

Card 35.

1. £4,307 1s. 3d.
2. £14 2s. 8¼d. + 18 q.
3. 15 sq. yds. 3 sq. ft.
4. £25 10s.

Card 36.

1. £440,292 19s. 8½d.
2. £808 17s. 4½d.
3. 13,550 stones.
4. 63,360 times.

Card 37.

1. £1,923 3s. 9¼d. + 214 q.
2. 992 fur. 28 po. 5 yds.
3. 1,953 qrs. 1 bus.
4. £20 16s. 8d.

Card 38.

1. £7,598 11s. 2¼d.
2. £363 17s. 1¾d. + 92 q.
3. 20 tons 18 cwt. 2 qrs. 3 lbs.
4. 126 times.

Card 39.

1. £701 8s. 9d.
2. £505 10s. 2¼d. + 118 q.
3. 870 half pints.
4. £293.

Card 40.

1. £6,766 10s.
2. £1 6s.
3. 504,360 minutes.
4. £10.

cher who is the FIRST to point out an Error in the above Answers.

ONDON: